Manalapan and Matchaponix Brooks Watershed

Preliminary Flood Damage and Mitigation Report

Rescue Workers on West Railroad Avenue, Jamesburg on July 17, 2005
Source: www.jamesburg.net/flood2005.html

Technical Assistance Provided by
USDA Natural Resources Conservation Service through
Freehold Soil Conservation District

To
County of Middlesex, New Jersey

South Central Middlesex County
Flood Control Commission

April, 2010

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Introduction

A Flood Control Commission, modeled after the Green Brook Flood Control Commission located in Somerset, Middlesex and Union Counties, was formed in 2005 following the July 17, 2005 flood. The Commission is made up of representatives from the following:

East Brunswick Township
Helmetta Borough
Jamesburg Borough
Monroe Township
Old Bridge Township
South River Borough
Spotswood Borough

The County of Middlesex entered into an agreement with the United States Department of Agriculture - Natural Resource Conservation Service (NRCS) in September of 2008 for the development of a preliminary watershed study to examine the nature and extent of flooding and develop preliminary solutions for flood damage reduction. Figure 1 shows the Manalapan and Matchaponix Creek Watershed location and subwatersheds.

Watershed Setting and Description

The Manalapan and Matchaponix Brook Watersheds are located in Middlesex and Monmouth Counties. Table 1 and 2 show the total acreage for each watershed as well as the acres and percent for each of the municipalities and counties as a proportion of each watershed. East Brunswick Township, Englishtown Borough, Freehold Township, Freehold Borough, Helmetta Borough, Jamesburg Borough, Manalapan Township, Marlboro Township, Millstone Township, Monroe Township, Old Bridge Township, Spotswood Borough, South Brunswick Township are located either wholly or partially in the watershed.

Figure 1 - Watershed Location and Subwatershed Map

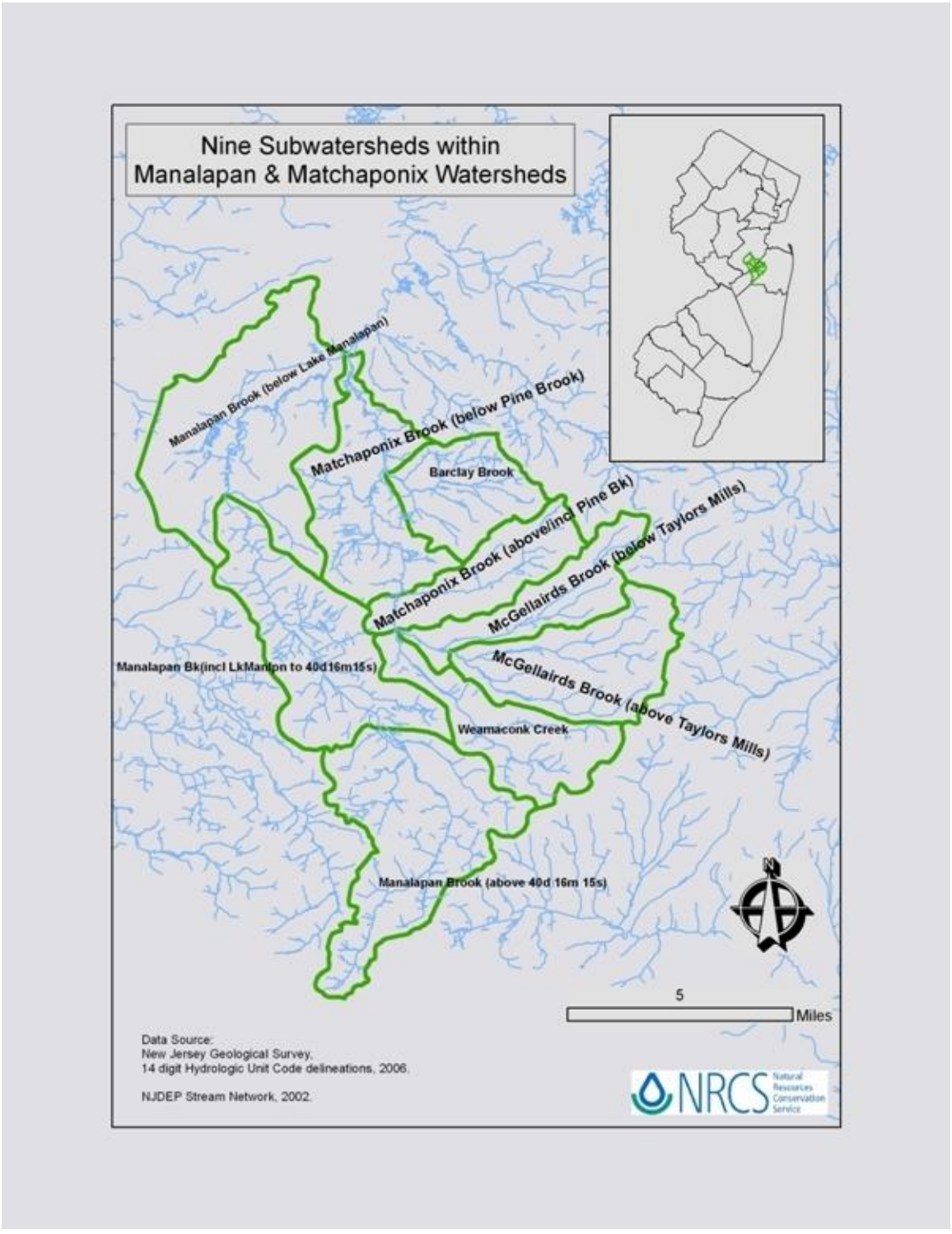


Table 1 - Manalapan Brook Watershed Acres by County and Municipality

Watershed	County	Municipality	Acres	Percent of Watershed
Manalapan Brook				
		East Brunswick Twp.	2122.1	7.54891
		Helmetta Borough	570.3	2.02277
		Jamesburg Borough	543.5	1.93347
		Monroe Township	11,232.0	39.9573
		South Brunswick Twp.	421.7	1.50017
		Spotswood Borough	878.7	3.12593
	Middlesex		15,768.3	56.0939
		Englishtown Borough	3.3	0.01173
		Freehold Township	685.3	2.43685
		Manalapan Township	9372.8	33.34329
		Millstone Township	2280.7	8.11348
	Monmouth		12,342.1	43.90643

Table 2 - Matchaponix Brook Watershed Acres by County and Municipality

Watershed	County	Municipality	Acres	Percent of Watershed
Matchaponix Brook				
		Monroe Township	4214.0	14.87880
		Old Bridge Township	4226.7	14.92373
		Spotswood Borough	64.6	0.2
	Middlesex		8505.3	30.03071
		Englishtown Borough	369.9	1.30605
		Freehold Borough	557.0	1.96666
		Freehold Township	3726.4	13.15726
		Manalapan Township	10,140.8	35.80538
		Marlboro Township	5,022.4	17.73321
	Monmouth		19,817.2	69.97104

Figure 2 shows the Watershed county and municipality locations.

Table 3 and Table 4 show the acres and percent land use, respectively, within the Manalapan Brook and Matchaponix Brook Watersheds. The land uses shown are for watershed description purposes. The land uses used in the runoff curve number analyses later in this document use Anderson land use classification system which has approximately 32 different land uses.

Figure 2 - County and Municipality Location Map

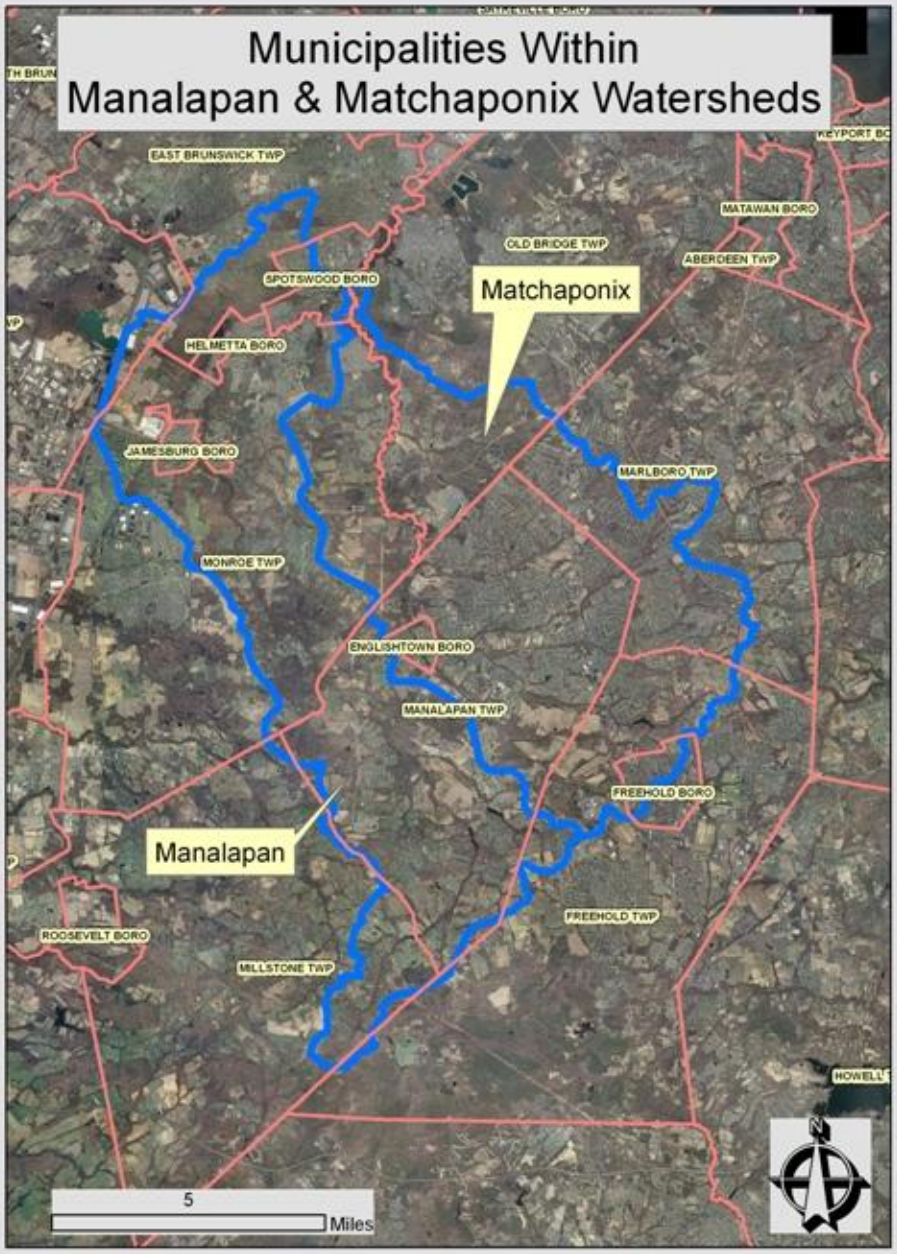


Table 3 - Manalapan Brook Watershed Land Use

Land Use	Acres	Percent of Watershed
AGRICULTURE	3922	14.0
BARREN LAND	733	2.6
FOREST	6348	22.6
URBAN	9705	34.5
WATER	394	1.4
WETLANDS	6993	24.9
TOTAL	28095	100.0

Source: NJDEP 2002 Land use/Landcover Update. New Jersey Department of Environmental Protection (NJDEP), Office of Information Resources Management (OIRM), Bureau of Geographic Information Systems (BGIS).
Online Linkage: http://www.state.nj.us/dep/gis/lulc02cshp.html

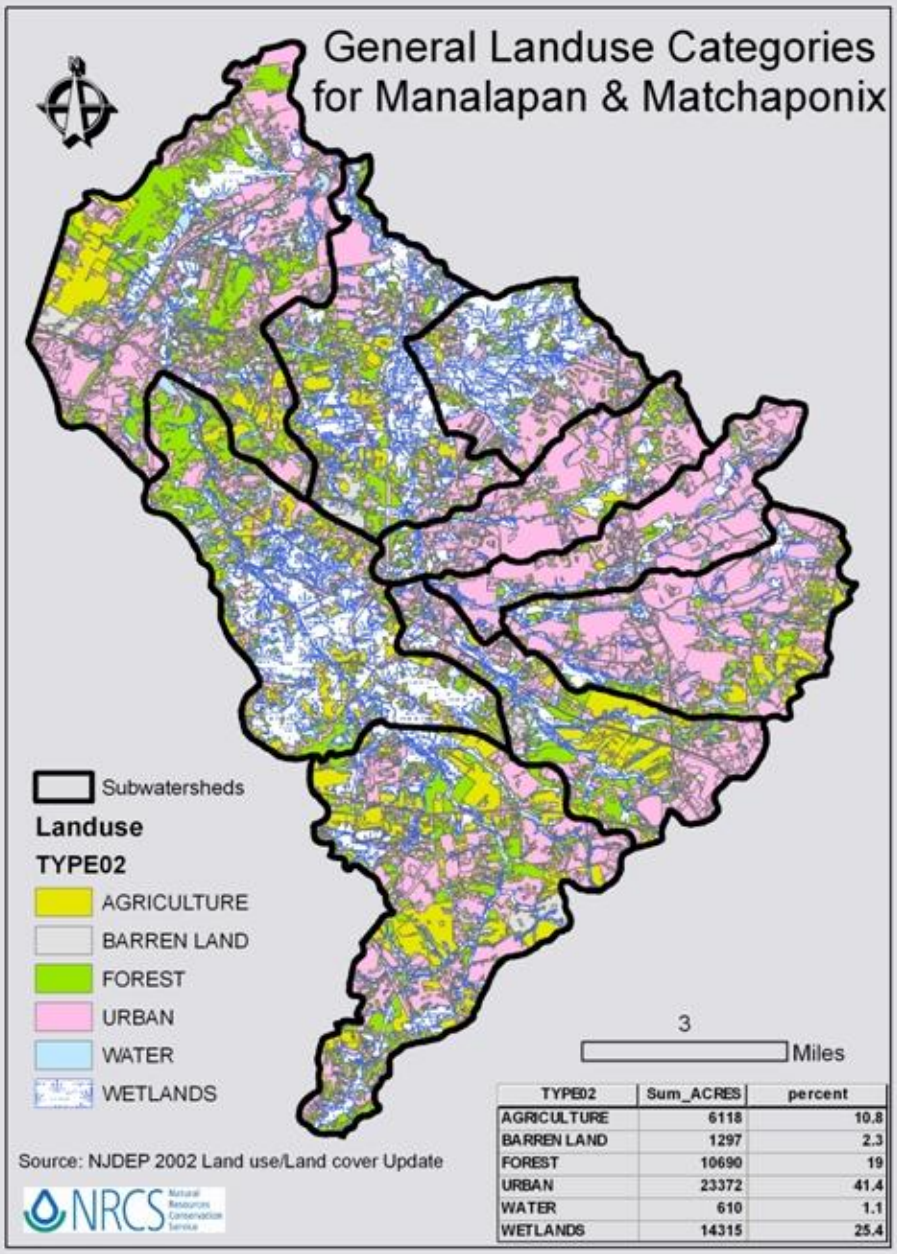
Table 4 - Matchaponix Brook Watershed Land Use

Land Use	Acres	Percent of Watershed
AGRICULTURE	2196	7.8
BARREN LAND	565	2.0
FOREST	4342	15.3
URBAN	13667	48.3
WATER	215	0.8
WETLANDS	7322	25.8
TOTAL	28307	100.0

Source: NJDEP 2002 Land use/Land cover Update. New Jersey Department of Environmental Protection (NJDEP), Office of Information Resources Management (OIRM), Bureau of Geographic Information Systems (BGIS).
Online Linkage: http://www.state.nj.us/dep/gis/lulc02cshp.html

Figure 3 shows the watershed land use. Figure 4 shows the preserved farmland in the watershed. Figure 5 shows the Manalapan and Matchaponix Brook Watershed hydrologic soil group map.

Figure 3 - Land Use Map



TYPE02	Sum_ACRES	percent
AGRICULTURE	6118	10.8
BARREN LAND	1297	2.3
FOREST	10690	19
URBAN	23372	41.4
WATER	610	1.1
WETLANDS	14315	25.4

Figure 4 - Preserved Farm Land Map

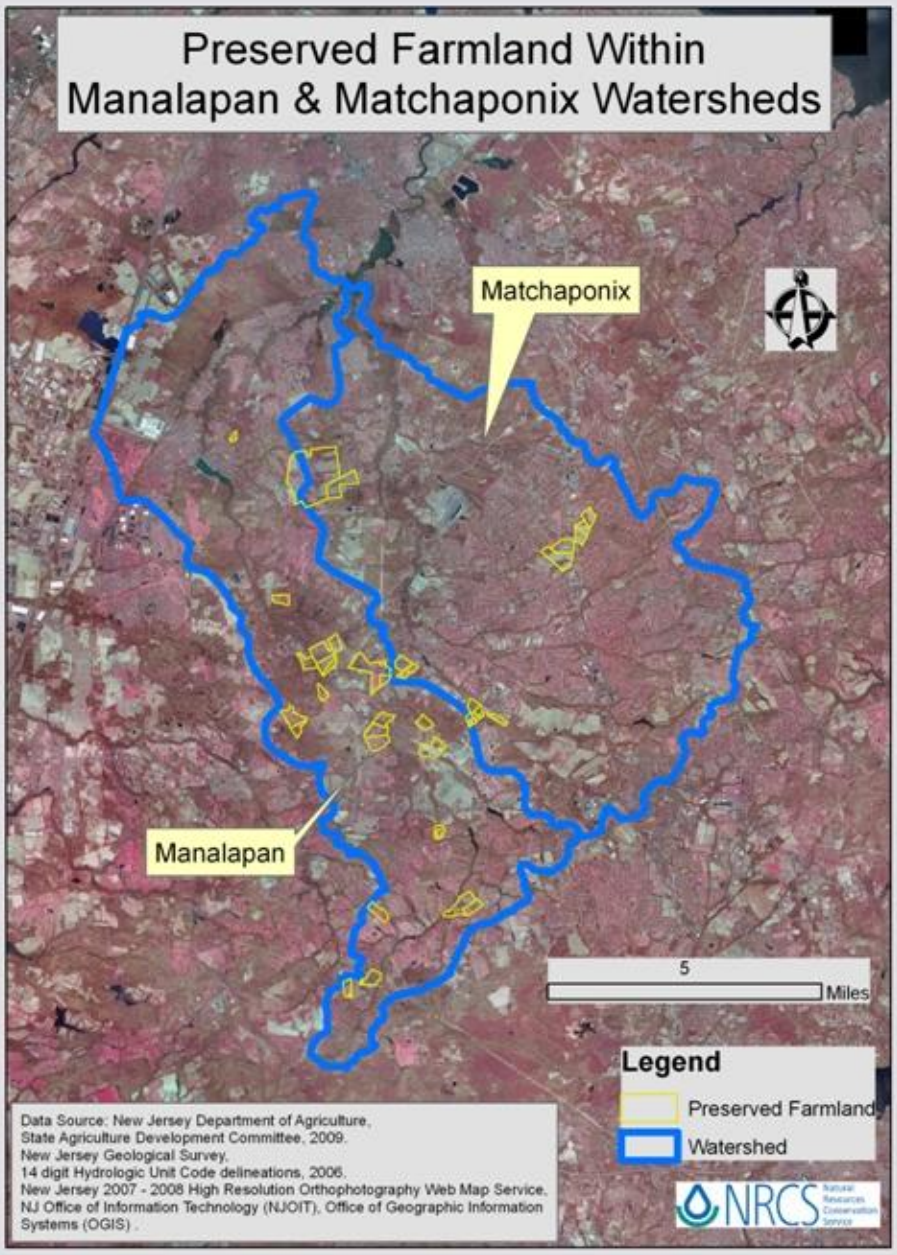


Figure 5 - Hydrologic Soil Group Map

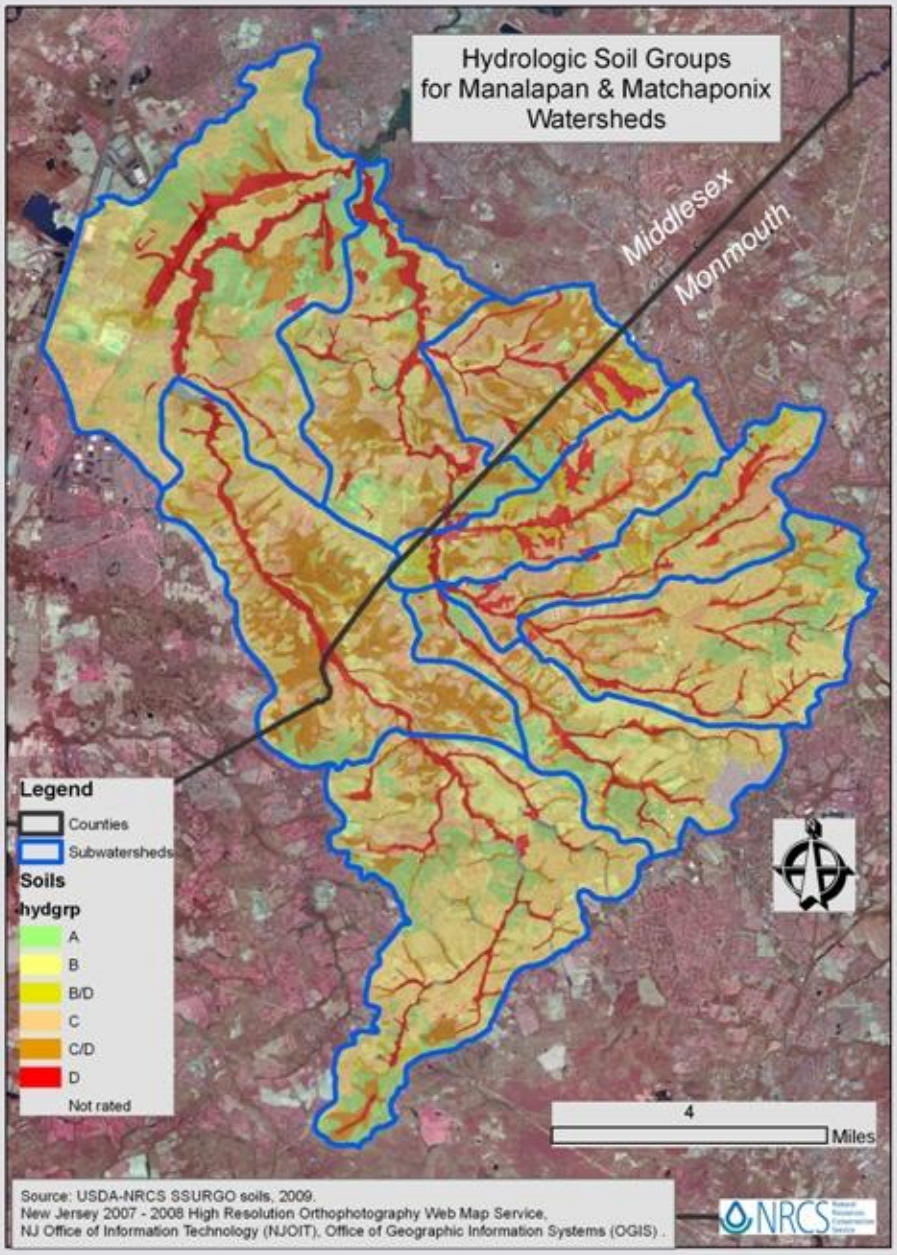


Table 5 - Manalapan and Matchaponix Brook Watershed Soils

Hydrologic Soil Group	Acres	Percent of Watershed
A	8807	15.6
B	23045	40.9
B/D	1568	2.8
C	8446	15.0
C/D	8707	15.4
D	5282	9.3
Not Rated	547	1.0
TOTAL	56402	100.00

Table 5 shows the hydrologic soil group acre and percentage of the Manalapan and Matchaponix Brook Watersheds.

There are four basic hydrologic soil groups (HSGs) (NRCS, 2009). The HSGs are as follows:

Group A—Soils in this group have low runoff potential when thoroughly wet. Water is transmitted freely through the soil. Group A soils typically have less than 10 percent clay and more than 90 percent sand or gravel and have gravel or sand textures. Some soils having loamy sand, sandy loam, loam or silt loam textures may be placed in this group if they are well aggregated, of low bulk density, or contain greater than 35 percent rock fragments.The limits on the diagnostic physical characteristics of group A are as follows. The saturated hydraulic conductivity of all soil layers exceeds 40.0 micrometers per second (5.67 inches per hour). The depth to any water impermeable layer is greater than 50 centimeters [20 inches]. The depth to the water table is greater than 60 centimeters [24 inches]. Soils that are deeper than 100 centimeters [40 inches] to a water impermeable layer and a water table are in group A if the saturated hydraulic conductivity of all soil layers within 100 centimeters [40 inches] of the surface exceeds 10 micrometers per second (1.42 inches per hour).

Group B—Soils in this group have moderately low runoff potential when thoroughly wet. Water transmission through the soil is unimpeded. Group B soils typically have between 10 percent and 20 percent clay and 50 percent to 90 percent sand and have loamy sand or sandy loam textures. Some soils having loam, silt loam, silt, or sandy clay loam textures may be placed in this group if they are well aggregated, of low bulk density, or contain greater than 35 percent rock fragments.The limits on the diagnostic physical characteristics of group B are as follows. The saturated hydraulic conductivity in the least transmissive layer between the surface and 50 centimeters [20 inches] ranges from 10.0 micrometers per second (1.42 inches per hour) to 40.0 micrometers per second (5.67 inches per hour). The depth to any water impermeable layer is greater than 50 centimeters [20 inches]. The depth to the water table is greater than 60 centimeters [24 inches]. Soils that are deeper than 100 centimeters [40 inches] to a water impermeable layer and a water table are in group B if the saturated hydraulic conductivity of all soil layers within 100 centimeters [40 inches] of the surface exceeds 4.0 micrometers per second (0.57 inches per hour) but is less than 10.0 micrometers per second (1.42 inches per hour).

Group C—Soils in this group have moderately high runoff potential when thoroughly wet. Water transmission through the soil is somewhat restricted. Group C soils typically have between 20 percent and 40 percent clay and less than 50 percent sand and have loam, silt loam, sandy clay loam, clay loam, and silty clay loam textures. Some soils having clay, silty clay, or sandy clay textures may be placed in this group if they are well aggregated, of low bulk density, or contain greater than 35 percent rock fragments.The limits on the diagnostic physical characteristics of group C are as follows. The saturated hydraulic conductivity in the least transmissive layer between the surface and 50 centimeters [20 inches] is between 1.0 micrometers per second (0.14 inches per hour) and 10.0 micrometers per second (1.42 inches per hour). The depth to any water impermeable layer is greater than 50 centimeters [20 inches]. The depth to the water table is greater than 60 centimeters [24 inches]. Soils that are deeper than 100 centimeters [40 inches] to a restriction and a water table are in group C if the saturated hydraulic conductivity of all soil layers within 100 centimeters [40 inches] of the surface exceeds 0.40 micrometers per second (0.06 inches per hour) but is less than 4.0 micrometers per second (0.57 inches per hour).

Group D—Soils in this group have high runoff potential when thoroughly wet. Water movement through the soil is restricted or very restricted. Group D soils typically have greater than 40 percent clay, less than 50 percent sand, and have clayey textures. In some areas, they also have high shrink-swell potential. All soils with a depth to a water impermeable layer less than 50 centimeters [20 inches] and all soils with a water table within 60 centimeters [24 inches] of the surface are in this group, although some may have a dual classification, as described in the next section, if they can be adequately drained.The limits on the physical diagnostic characteristics of group D are as follows. For soils with a water impermeable layer at a depth between 50 centimeters and 100 centimeters [20 and 40 inches], the saturated hydraulic conductivity in the least transmissive soil layer is less than or equal to 1.0 micrometers per second (0.14 inches per hour). For soils that are deeper than 100 centimeters [40 inches] to a restriction or water table, the saturated hydraulic conductivity of all soil layers within 100 centimeters [40 inches] of the surface is less than or equal to 0.40 micrometers per second (0.06 inches per hour).*Dual hydrologic soil groups*—Certain wet soils are placed in group D based solely on the presence of a water table within 60 centimeters [24 inches] of the surface even though the saturated hydraulic conductivity may be favorable for water transmission. If these soils can be adequately drained, then they are assigned to dual hydrologic soil groups (A/D, B/D, and C/D) based on their saturated hydraulic conductivity and the water table depth when drained. The first letter applies to the drained condition and the second to the undrained condition. For the purpose of hydrologic soil group, adequately drained means that the seasonal high water table is kept at least 60 centimeters [24 inches] below the surface in a soil where it would be higher in a natural state.

Flooding History

Prior and On-going Studies

A review of available information in the NRCS and Middlesex County Planning Department's files on the history of flooding in the Manalapan and Matchaponix Watersheds was completed. Also, a web search was made to identify any news articles on flooding here. In addition, the National Flood Insurance Program flood claims database was obtained for this vicinity. A contact was made with the NJ Water Science Center (USGS) at West Trenton for any information they would have on flooding here.

NRCS (then known as the Soil Conservation Service or SCS) previously reviewed these watersheds as part of North Atlantic Region Watershed Inventory done in 1966. Based on a review of the files, it appears that up to a dozen potential dam sites were analyzed for water storage in the Deep Run, Matchaponix Brook, Pine Brook, McGelliards Brook and Manalapan Brooks.

During the 1975-1976 time frame there was a concentrated watershed planning (PL83-566) effort in the Manalapan Brook. A group of landowners, who had made requests for assistance to the State of New Jersey in 1948 and then to the SCS in 1960, again made a request to SCS. This request, like earlier the earlier ones, was the result of their farming operations being interrupted by high water levels from the Brook. The application for assistance included problems due to poor drainage and flooding of cropland and roads, the need for irrigation water supply, wildlife development and protection and the installation of conservation treatment measures on the land. A system of multi-purpose flood prevention-drainage channels was considered and determined to not be justified due to a benefit cost ratio of 0.6 to 1.0.

In the lower part of the South River basin, an April 2002 Draft Integrated Feasibility Report and Environmental Impact Statement (Corps of Engineers, 2002) was completed by the US Army Corps of Engineers for South River, Raritan River Basin Hurricane & Storm Damage Reduction and Ecosystem Restoration. The study focused on flood-prone areas of the Boroughs of South River and Sayreville, the Township of Old Bridge, and the Historic Village of Old Bridge (located within the Township of East Brunswick). Based on coordination with NJDEP, County and local governments, the areas upstream of the Duhernal Lake dam (upstream end of tidal influence) were identified, as of that date, as having "no widespread flooding problems."

According to the US Army Corps (2002), there was fluvial flooding (upstream of Duhernal Lake) in August and September 1971 (Hurricane Doria) which resulted from 8 inches of rain in the watershed and was exacerbated by storm surge associated with the storm. Estimated damages of $1.4 million (2001 dollars) in South River, Sayreville, and Spotswood occurred due to this event. An April 1984 storm, for which no damage estimates are available, caused minor flooding above Duhernal Lake. A December 1992 northeaster coastal storm stalled over the New York metropolitan area. There were approximately 4-5 inches of rain, unsually high tides and high winds. The National Flood Insurance Program Flood Claims by Flood Event (Table 8)

confirms this event to be second only to the July 2005 event in terms of the number of flood claims filed.

According to FEMA (FEMA, 2009), there have been historic flood flows in Manalapan Brook in 1968 and 1975 at Spotswood as shown by the USGS gaging station (No. 01405400) there. Flood flows have also been recorded in 1968 and 1975 at Helmetta based on the Information on these flood flows are shown in Table 6. Based on Table 6, it also appears that the Hurricane Doria event was a significant flood event here.

The three most recent significant flood events identified have been the September 29, 2004, July 19, 2005 and April 16, 2007 flood events

Municipal Interviews

An outreach effort was made to appropriate officials in each of the municipalities to gather information on flooding in their respective municipalities as follows:

Spotswood Borough – June 17, 2009
Helmetta Borough – June 29, 2009
South River Borough – July 13, 2009
Monroe Township – July 27, 2009
East Brunswick Township – July 28, 2009
South River Borough – July 29, 2009
Old Bridge Township – July 29, 2009
Jamesburg Borough – August 5, 2009

A series of questions were asked in each municipality as follows:

Municipal Official Interviews

1. Request Municipal Damage Assessments for September 29, 2004 and July 17, 2005 flood events.

2. Develop list of flooding areas in each municipality.

3. Obtain flood pictures from individuals, municipalities, newspapers and and others.

4. Identify types of flood damage as follows:

   Roads and bridges
   Residential
   Commercial
   Recreation
   Water and Sewer Plants
   Industrial

Educational
Other

5. Identify and define agricultural issues, if any.

6. Flooding prior to the 2004 and 2005 flood events?

7. Engineering survey made of the first floor elevations and low openings of flood damaged properties?

8. Can you provide me information on those properties which carry flood insurance?

9. Is there a summary of types of damages by structure showing water heater, Furnace/boiler, electric panel, washer/dryer, and whether the structural damage was minor or major?

10. Were first floors of homes flooded?

11. What are the house numbers of the homes?

12. Are any of these or other structures in the Borough/Township considered to be repetitive flood losses or severe repetitive flood losses?

13. What types of flood mitigation measures are you and your citizens considering?

14. What is the status of the Corps of Engineers project discussed in their 2002 Report?

A summary of several of these meetings is given in Appendix A.

July 17, 2005 Flooding on Willow Street in Jamesburg
Source: Ruth Longo of Jamesburg

July 17, 2005 Flooding on West Railroad Avenue in Jamesburg
Source: Tiffany Hladinec of Monroe Township

July 17, 2005 Flooding in Jamesburg at Forsgate Avenue and Perrineville Road
Source: Jennifer Brunner of Jamesburg

July 17, 2005 Flooding at Thompson Park entrance in Jamesburg
Source: Wayne Speranza of Jamesburg

July 17, 2005 Flooding on Pergola Avenue in Jamesburg
Source: Darren Larsen of Jamesburg

July 17, 2005 Flooding in Spotswood, NJ (Photos Courtesy of Police Chief Karl Martin)

National Flood Insurance Program Claims

Homeowners and others with federally-backed mortgages are required to carry flood insurance. While not every property owner carries flood insurance, a review of data from the National Flood Insurance Program (NFIP) flood claims database provides the best available, long-term source of information. The flood claims database for the flood damage vicinity shows that in the Middlesex County portion of the watershed there are at least 7 repetitive flood loss (those having made two or more claims) properties and a total 57 flood-insured properties affected by flooding. In the Middlesex County portion of the watershed, total claims of $875,124 for structural damages and $150,776 for contents damages ($622,173 for structural damages and $22,388 for content damages for Helmetta, Jamesburg and Spotswood) have been made for flood events which occurred since the beginning of the NFIP in 1978. The table below shows the number of claims made by flood event. The most recent flood events show the largest number of claims.

According to the Middlesex County Multi-Jurisdictional Hazard Mitigation Plan (Middlesex County, August, 2008), on July 17, 2005 flash flooding occurred in the Manalapan Brook Basin in which impacted seven municipalities; East Brunswick, Jamesburg, Monroe, Spotswood, Helmetta, South River and Old Bridge. Collectively the flood damages to these areas totaled $9.7 million. A total of 308 homes, 25 apartments, 20 businesses and one industrial facility were damaged.

The July 2005 flood event caused significant flooding in Helmetta, Jamesburg, Spotswood, and other surrounding areas. In these three municipalities floodwaters from the event inundated and damaged a total of 440 residential homes and 20 businesses. In Jamesburg a total of 7-8 inches of rain fell within a period of several hours. The excess rainfall in such a short period of time resulted in flash flooding in Jamesburg that inundated approximately 75 residential homes and 12 businesses causing an estimated $3.4 million in damages. Flooded areas within the Borough included West Railroad Avenue, East Church Street, Pergola Avenue, Willow Street, Forsgate Drive, and Gatzmer Avenue. The storm also caused significant infrastructure damages in Jamesburg including a 60 inch drainpipe that collapsed near the intersection of Forsgate Drive and West Railroad Avenue. The collapsed drainpipe created a 20 foot sinkhole undermining the roadway and causing an estimated $600,000 in damages. In Spotswood and Helmetta the damages from the event were estimated at $2.2. million and $750,000 respectively (Middlesex County, 2008).

Another account of the event from the National Climatic Data Center (Rennels, 2009) is as follows:

Thunderstorms with torrential downpours caused flash flooding in the Manalapan Brook basin in southeastern Middlesex County as a Doppler Radar estimated storm totals of between 6 and 8 inches fell over the basin. Damage was estimated at $10.25 million as 308 homes, 25 apartments, 20 businesses and one industrial facility were damaged. Six homes suffered major damage (flooding into the first floor). About 800 persons were evacuated from Jamesburg, Spotswood, Helmetta and Monroe. A state of emergency was declared in Jamesburg. Motorists were trapped in rising flood waters and numerous basements were flooded throughout the

county. The dam at Lake Manalapan was opened to prevent the dam from breaking. Utilities cut off the electricity and gas supplies to affected homes. In Jamesburg Borough, the downtown business district was flooded as was the Borough Hall and the Firehouse. About 340 persons were evacuated and some stayed at a Red Cross Shelter at a local school. Most of the downtown businesses were reopened within about one week. Damage in the borough was estimated at 3.4 million dollars. In Spotswood Borough, 360 persons were evacuated from about 120 homes. Damage was estimated at 2.2 million dollars. In Helmetta Borough, it was common to have five feet of water in basements. In Monroe Township, elderly residents from the Rossmoor Adult Community and the Monroe Village Retirement Community were evacuated. Damage was estimated at 1.4 million dollars. Flood waters receded on the 18th and only about 25 homes were without working utilities on the evening of the 18th. The Manalapan Creek at Spotswood had a record breaking crest of 20.42 feet on the 20th. The previous record crest was 19.97 feet set in 1989. The period of record for the river gage is 47 years. Storm totals included 3.25 inches in Old Bridge and 1.62 inches in New Brunswick; neither location was in the core of the heaviest rain.

According to the National Climatic Data Center of NOAA, there have been 52 flood event(s) were reported in Middlesex County, New Jersey between 01/01/1950 and 09/30/2008. Annual peak streamflow (USGS, 2008) data for the 51 years of record on the Manalapan Brook at Spotswood is displayed in Table 6.

Figures 6 through 12 are the updated Flood Insurance Map for municipalities in this vicinity. These maps are provisional until their certification expected in April 2010 (Racz, 2009).

Figure 6 - Flood Insurance Map – East Brunswick Township

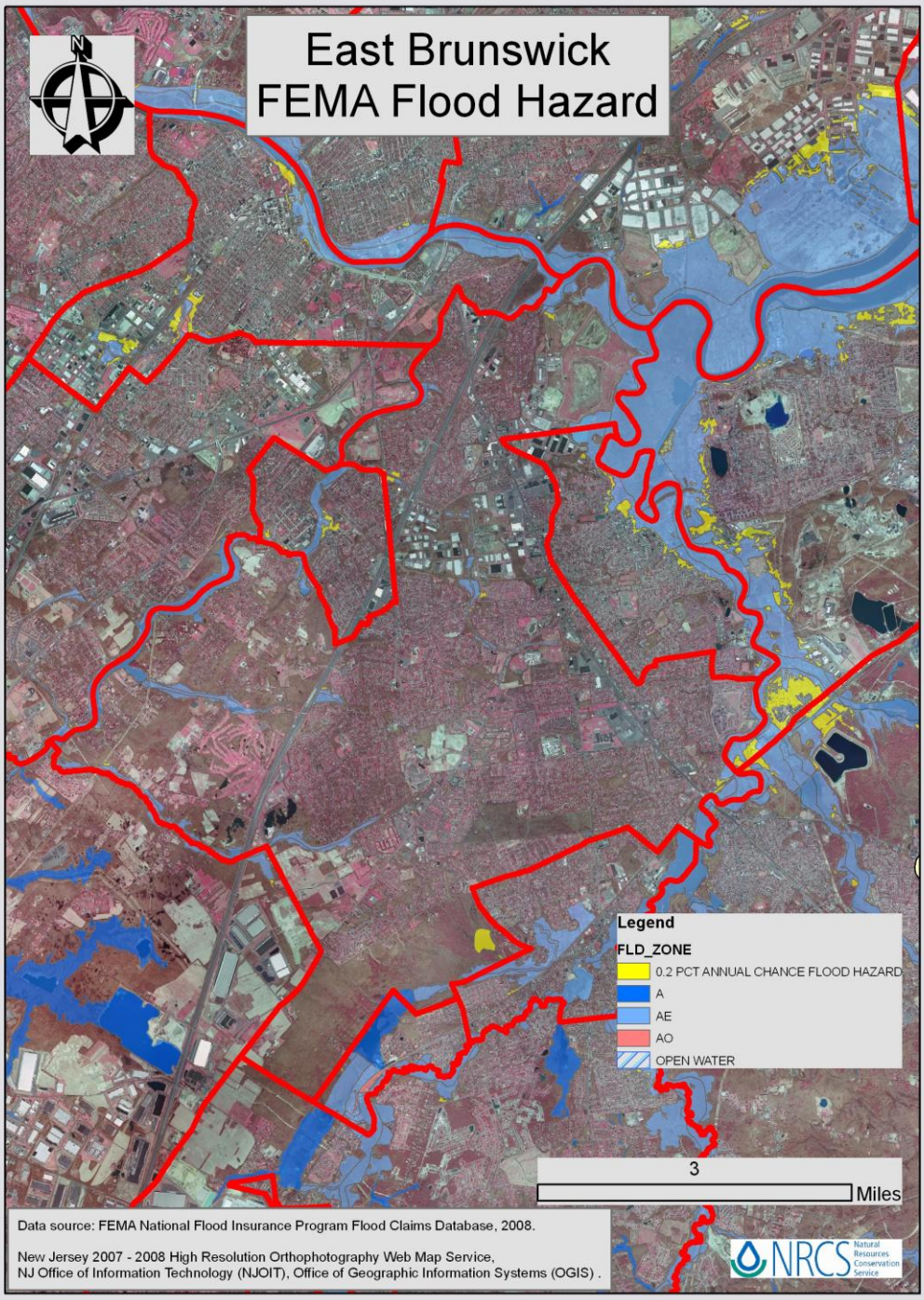


Figure 7 - Flood Insurance Map – Helmetta Borough

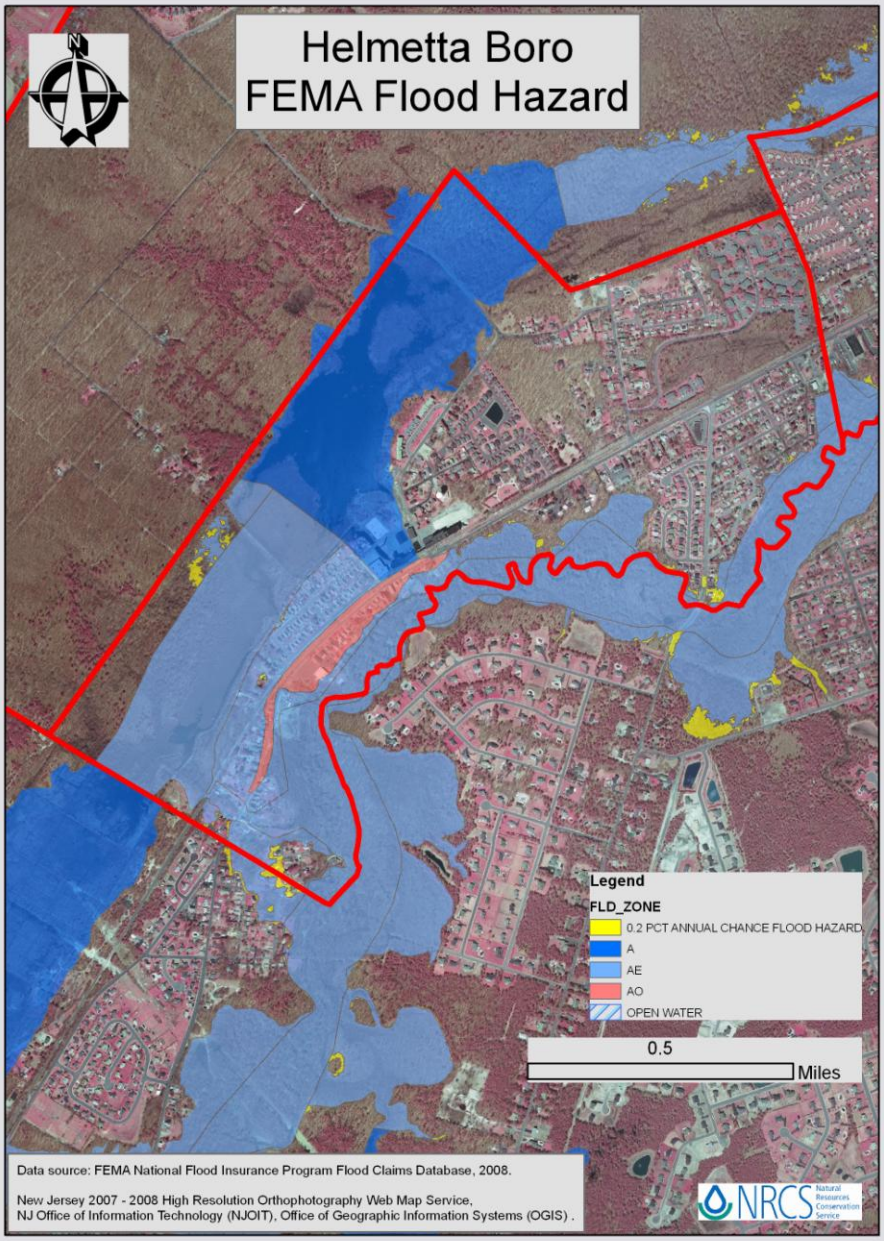


Figure 8 - Flood Insurance Map – Jamesburg Borough

Figure 9 - Flood Insurance Map – Monroe Township

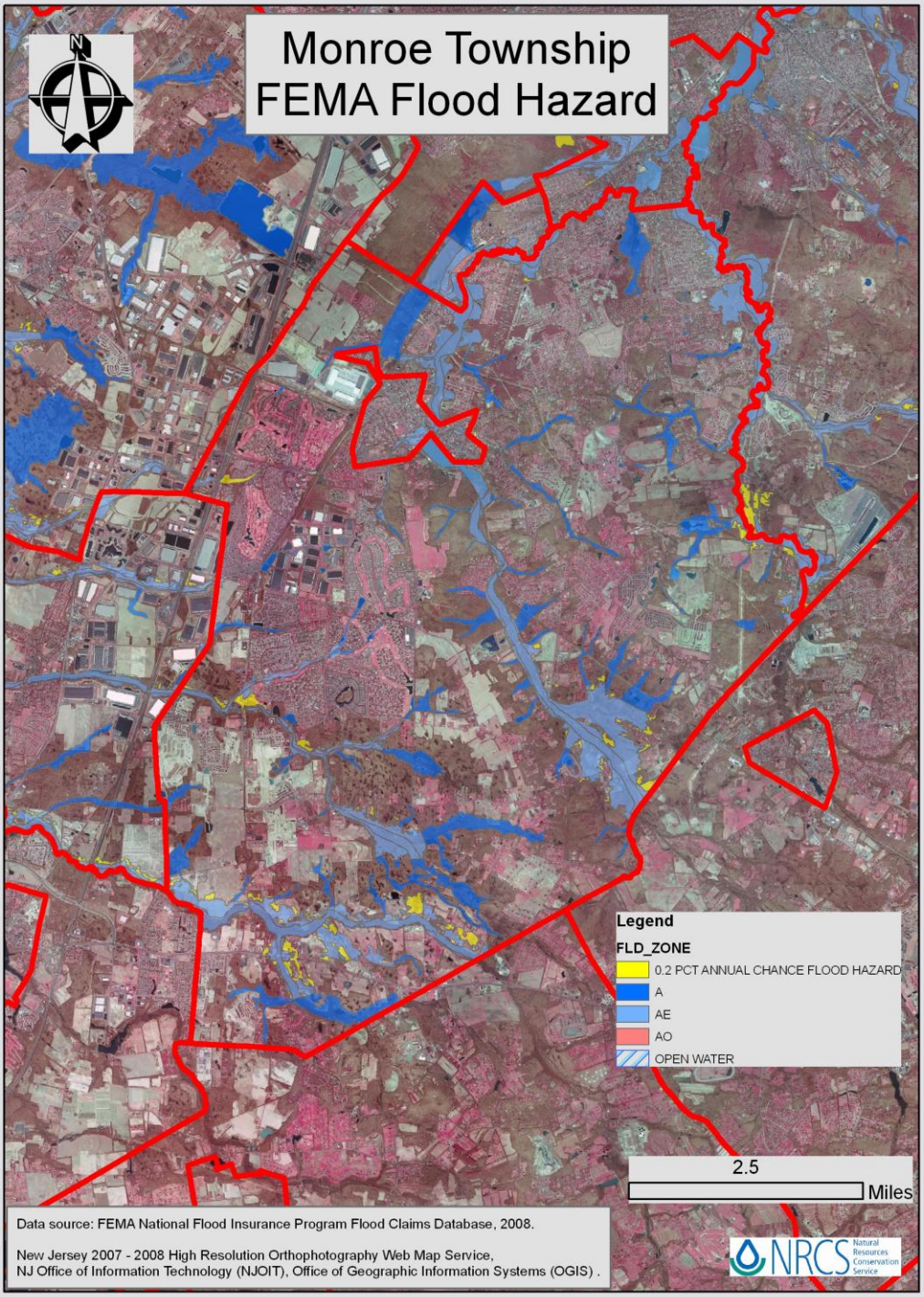


Figure 10 - Flood Insurance Map – Old Bridge Township

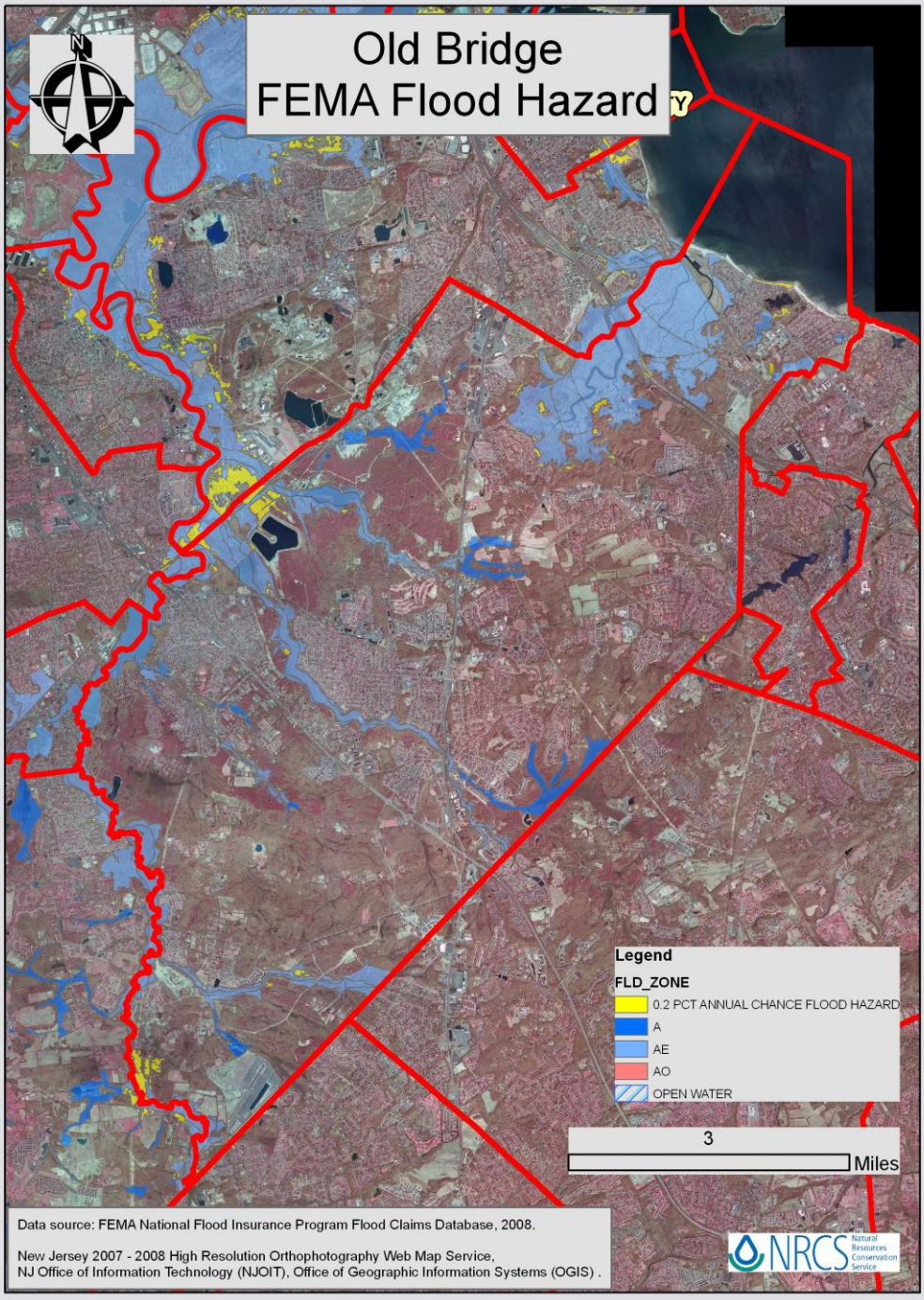


Figure 11 - Flood Insurance Map – South River Borough

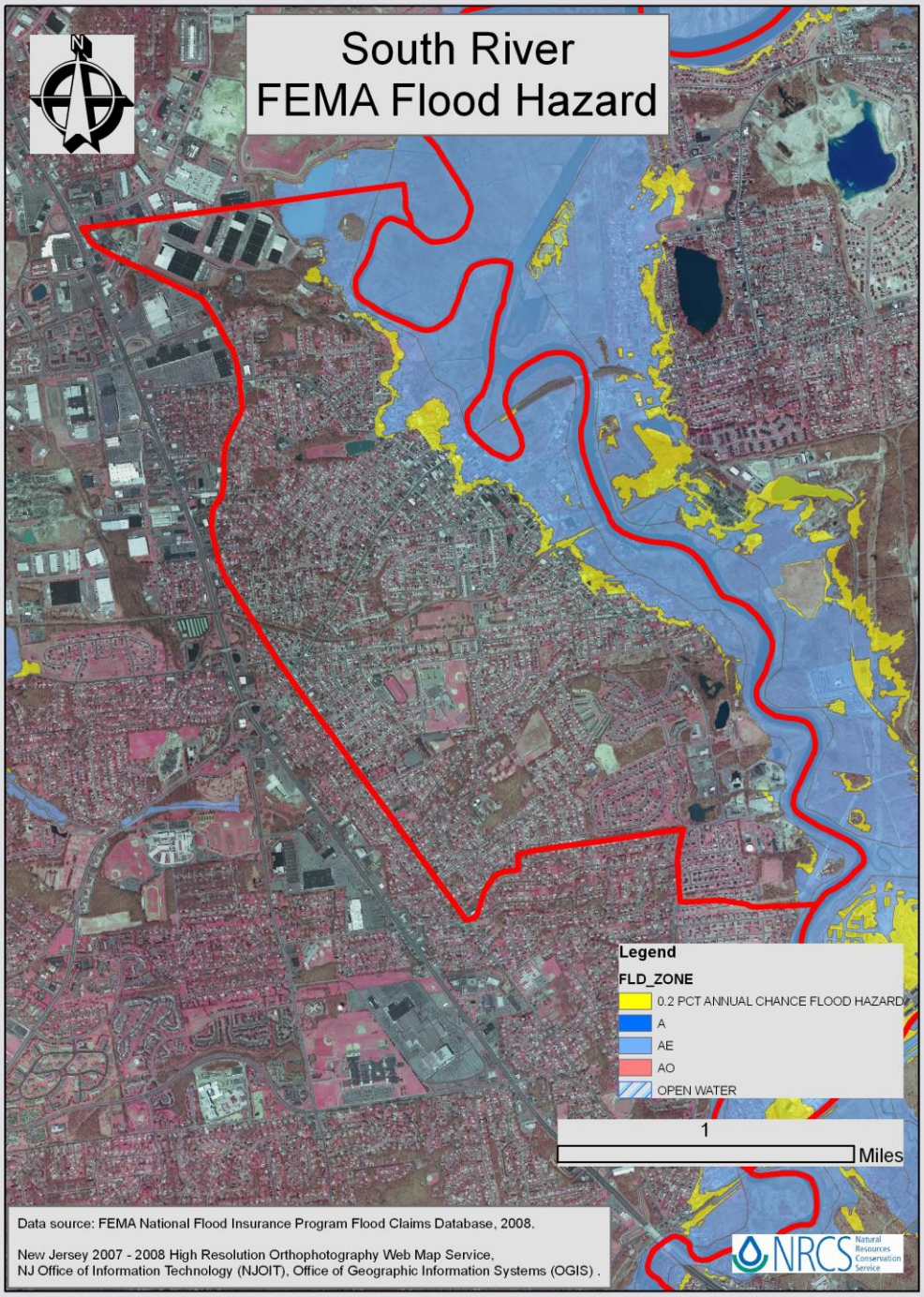


Figure 12 - Flood Insurance Map – Spotswood Borough

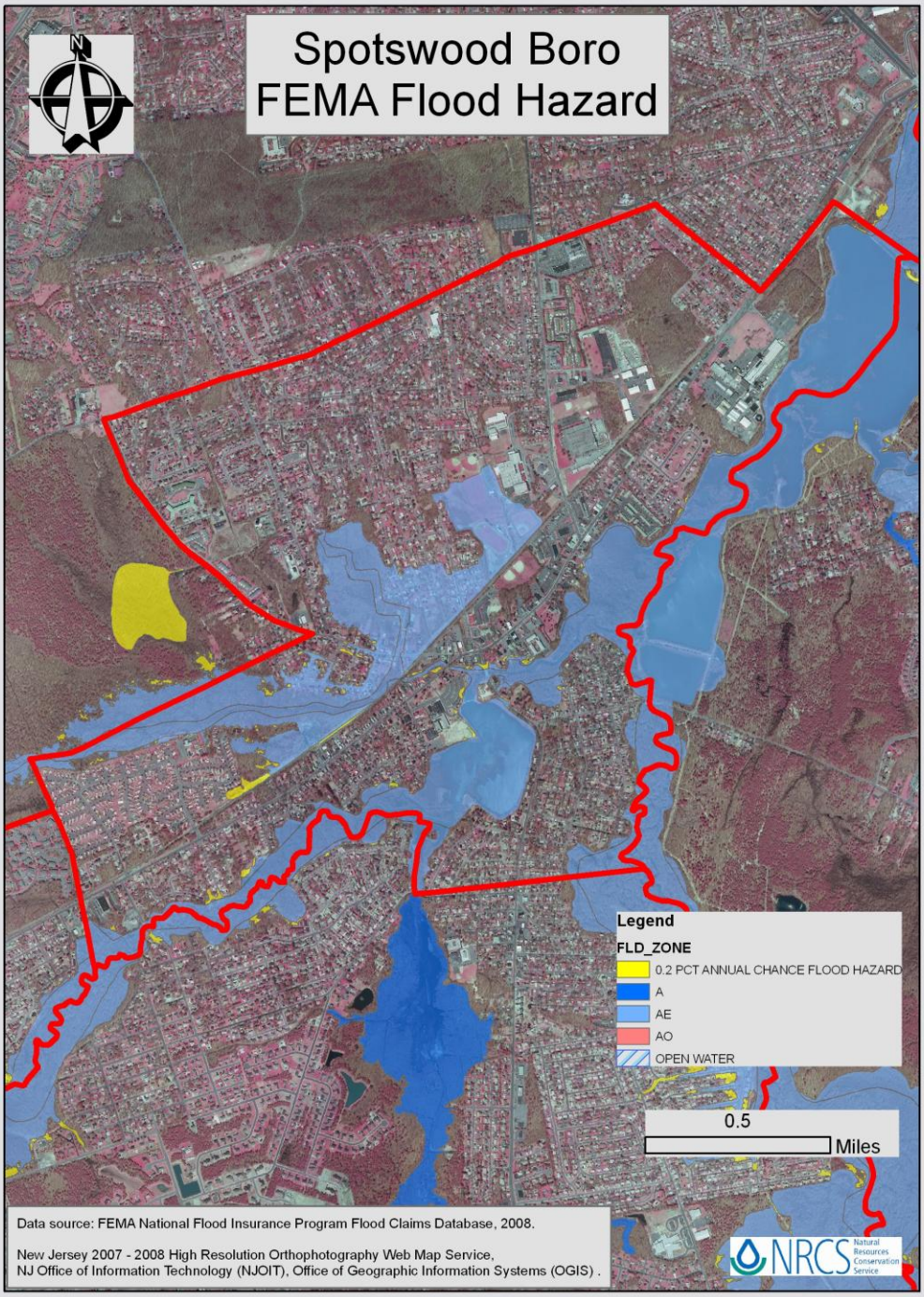


Table 6 - Peak Annual Streamflow on Manalapan Brook at Spotswood, NJ

Water Year	Date	Gage Height (feet)	Stream-flow (cfs)
1957	Apr. 06, 1957	18.61	335[5]
1958	Jan. 16, 1958	19.07	625[5]
1959	Jul. 25, 1959	18.95	541[5]
1960	Sep. 13, 1960	19.22	860[5]
1961	Apr. 14, 1961	18.79	565[5]
1962	Mar. 12, 1962	18.93	527[5]
1963	Mar. 08, 1963	18.72	400[5]
1964	Apr. 09, 1964	18.52	323[5]
1965	Feb. 09, 1965	18.69	382[5]
1966	Feb. 14, 1966	18.85	541[5]
1967	Mar. 08, 1967	18.96	672[5]
1968	May 30, 1968	19.90	1,650[5]
1969	Jul. 31, 1969	18.59	359[5]
1970	Dec. 28, 1969	18.54	559[5]
1971	Aug. 28, 1971	19.76	1,420[5]
1972	Dec. 01, 1971	18.81	542[5]
1973	Feb. 03, 1973	18.92	651[5]
1974	Dec. 22, 1973	19.14	841[5]
1975	Jul. 21, 1975	19.41	1,080[5]
1976	Jan. 29, 1976	18.77	508[5]
1977	Feb. 26, 1977	18.54	371[5]
1978	Jan. 27, 1978	19.57	1,290[5]
1979	Jan. 22, 1979	19.72	1,320[5]
1980	Apr. 11, 1980	19.00	712[5]
1981	May 12, 1981	18.40	230[5]
1982	Feb. 04, 1982	18.59	339[5]
1983	Apr. 11, 1983	18.78	461[5]
1984	May 31, 1984	19.62	1,270[5]
1985	Feb. 14, 1985	18.84	504[5]
1986	Apr. 18, 1986	19.34	926[5]
1987	Jul. 04, 1987	18.68	395[5]
1988	Jul. 27, 1988	18.50	286[5]
1989	Sep. 20, 1989	19.97	1,700[5]
1990	Aug. 12, 1990	19.03	649[5]
1991	Mar. 05, 1991	18.65	445[5]
1992	Jun. 21, 1992	19.13	773[5]
1993	Dec. 12, 1992	19.55	1,140[5]
1994	Jan. 29, 1994	19.57	1,170[5]
1995	Aug. 06, 1995	18.29	171[5]
1996	Jan. 20, 1996	19.54	1,160[5]
1997	Oct. 21, 1996	18.90	547[5]
1998	May 10, 1998	19.16	759[5]
1999	Sep. 17, 1999	18.66	555[5]
2000	Apr. 22, 2000	18.40	229[5]
2001	Mar. 31, 2001	18.81	482[5]
2002	May 19, 2002	18.43	227[5]
2003	Jun. 05, 2003	18.80	468[5]
2004	Sep. 29, 2004	19.26	880[5]
2005	Jul. 18, 2005	20.42	2,550[5]
2006	Oct. 14, 2005	19.18	820[5]
2007	Apr. 16, 2007	20.08	2,010[5]
2008	Feb. 14, 2008	18.66	400[5]

Peak Streamflow Qualification Codes. 5 -- Discharge affected to unknown degree by Regulation or Diversion

Source: US Geological Survey. New Jersey Water Science Center. 2008. (http://nwis.waterdata.usgs.gov/nwis/peak?site_no=01405400&agency_cd=USGS&format=html)

Table 7 - Summary of Preliminary Damage Assessments By Municipality for July 17, 2005 Flood

Municipality	Street Locations	Number of Structures with First Flood Damages	Water Depth on First Floor (Feet)	Number of Structures with Basement Flood Damages
East Brunswick	Bosco Drive	1	2	
	Roosevelt Road			2
	Buttonwood Drive			1
	Frances Road			9
	Jensen Street			2
	Meadow Road			2
	Henriett Street			1
	Helena Street			1
	Hillwood Road			1
	Clearview Road			1
	Hartman			1
	Taft Drive			1
	Queen Road			1
	Sandlewood Drive			1
	Milton Avenue			1
	Winton Road			1
	Bufford Run			1

Source: Municipal Preliminary Damage Assessments for July 17, 2005

Table 7 - Summary of Preliminary Damage Assessments By Municipality for July 17, 2005 Flood (Continued)

Municipality	Street Locations	Number of Structures with First Flood Damages	Water Depth on First Floor (Feet)	Number of Structures with Basement Flood Damages
Helmetta	High Street	1	3	
	Railroad Avenue	3	1.5	8
	John Street	0		18
Jamesburg	East Church Street	2	2-3	2
	Church Street	5	2	
	Gatzmer Street	0		20
	Pergola Street	5	0.5-3	1
	West Railroad Street	1	1	
	Willow Street			10
	William Street			10
Monroe	Rossmoor	15	0.25-1	5
Spotswood	Victoria Street	1	2	
	Doria Street			3
	Sidney Street			5

Source: Municipal Preliminary Damage Assessments for July 17, 2005

Table 7 is a display of the municipal preliminary damage assessments for the July 17, 2005 flood event in East Brunswick, Helmetta, Jamesburg, Monroe, and Spotswood.

A review of the July 17, 2005 damage report for Helmetta Borough showed that of the 43 property owners reporting damages only 11 or 26 percent had flood insurance. Three of these properties had “unsafe structures and cannot return now” labels suggesting flood damages to the first floor and/or the structure itself. Most of the damages occurred in the basements of these properties. Thirty one of the property owners had to replace their hot water heaters while 33 of them had to replace their furnace/boiler. Twenty five (25) of the property owners had to replace their electrical panels. Nine (9) of the property owners had to replace their washer/dryer.

Table 8 - National Flood Insurance Program Flood Claims by Flood Event for all Seven Municipalities and in Recent Damage Centers of Helmetta, Jamesburg and Spotswood

Flood Event	Number of Claims for Seven Municipalities	Number of Claims for Helmetta, Jamesburg and Spotswood
1/26/78	7	2
2/8/78	1	
7/15/78	1	
8/12/78	1	
1/21/79	4	2
8/10/79	1	
9/6/79	3	1
4/9/80	2	
7/29/80	1	
10/26/80	1	
3/21/83	2	1
4/10/83		1
3/29/84	1	
5/30/84		1
4/21/87	1	
7/26/88	2	
7/5/89		1
8/10/90		1
6/19/92	1	1
12/11/92	18	1
1/28/94	3	1
3/20/96	1	
10/19/96	3	
9/24/04	8	
7/24/00	1	
3/22/01	1	
2/22/03	1	
9/15/03	1	
9/29/04	2	
4/6/05	1	
7/17/05	37	32
4/16/07	11	

Source: National Flood Insurance Program Flood Claims, 2008

Table 8 shows the number of flood insurance claims under the National Flood Insurance Program by flood event for all seven municipalities and for the apparent damage centers of Helmetta, Jamesburg and Spotswood.

Table 9 - Recent Flood Events and Number of Properties Affected

Municipality	Flood Event Date	Precipitation Amount and Duration	Number of Affected Properties	Estimated Dollars of Damage
Helmetta Borough	9/04 7/15/05	6 inches 10 inches	103 homes	
Jamesburg Borough	9/04 7/15/05		150 homes	
Monroe Township	9/04 7/15/05		100 homes	
Old Bridge Township	9/04 7/15/05		1 home	
Spotswood Borough	9/04 7/15/05	10.5 inches in 3 hours	150 homes 8 businesses	$2.26 million

Source: Corps of Engineers Memorandum for Record – Middlesex County, NJ – July 2005 Flooding

Table 9 shows recent flood events, precipitation amounts, number of properties affected and, where available, estimated dollars of damage by municipality. The number of flooded properties shown above greatly exceeds the number of properties that have made flood insurance claims during the most recent flood events. This likely indicates that there are a number of properties that do not have National Flood Insurance Program coverage.

Figure 13 shows the location of National Flood Insurance Program claims within the Watershed and by municipality. Those locations with one claim are shown in yellow and those locations where there has been two or more claims or repetitive flood losses are shown in red.

Figure 13 - Historic Flood Damage Location Map

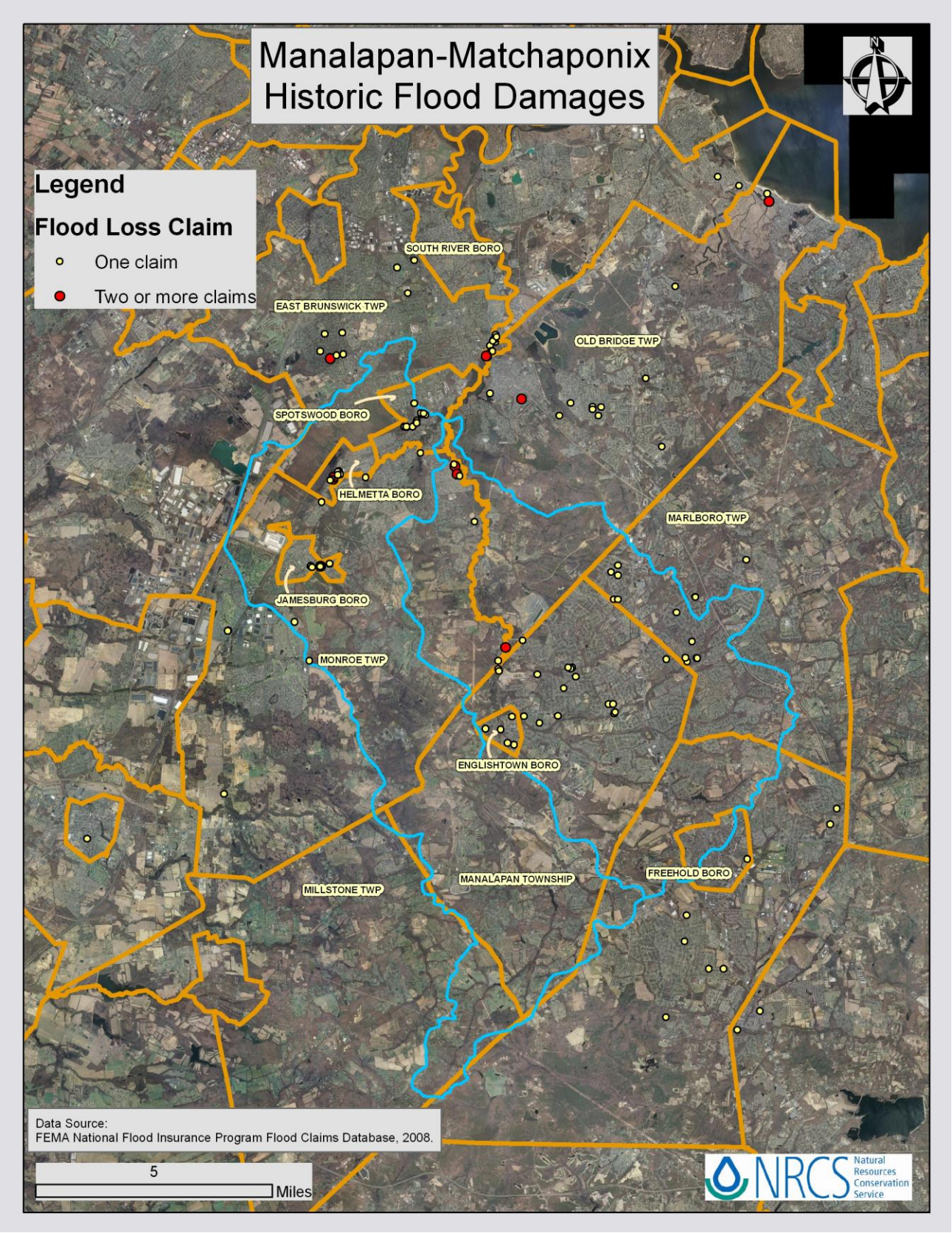


Table 10 - National Flood Insurance Program Repetitive Flood Claims for Middlesex County

Municipality	Number of Repetitive Claims
East Brunswick Township	1
Helmetta Borough	10*
Jamesburg Borough	2
Monroe Township	4*
Old Bridge Township	2*
Spotswood Borough	0
South River	11**
Total	15

Source: National Flood Insurance Program Flood Claims, December 2008
*Rizzo, K. April 3, 2009
** Rizzo, K. April 8, 2010

Table 11 - National Flood Insurance Program Repetitive Flood Claims for Monmouth County

Municipality	Number of Repetitive Claims
Englishtown Borough	2
Freehold Township	2
Manalapan Township	3
Marlboro Township	2*
Millstone Township	0
Total	8

Source: National Flood Insurance Program Flood Claims, December 2008
*Rizzo, K. April 3, 2009

Tables 10 and 11 show the number of repetitive (2 or more flood claims) by municipality in Middlesex and Monmouth Counties, respectively.

Table 12 - Dollars of Flood Damage to Structures and Contents by Municipality since 1978

Municipality	Structural Damages	Content Damages
East Brunswick Township	$123,752.18	$32,429.94
Helmetta Borough	74,477.66	3,799.72
Jamesburg Borough	103,604.66	5,247.50
Monroe Township	179,535.36	45,183.62
Old Bridge Township	206,612.30	54,464.75
South River Borough	676,151.00	79,639.00
Spotswood Borough	187,141.92	9,650.83
TOTAL	713,124.08	150,776.36

Source: National Flood Insurance Program Flood Claims Database, 2008

Table 12 shows the dollars of flood damage to structures and contents by municipality based on National Flood Insurance Program claims since 1978.

Table 13 shows the participation in the National Flood Insurance Program by the number of policies, coverage, number of claims and dollars claimed by municipalities within the Watershed.

Table 14 shows the number of National Flood Insurance Program policies, number of structures in the Special Flood Hazard Area and, where available, the percent of structures insured in the Special Flood Hazard Area.

Table 13 - National Flood Insurance Program Participation in Middlesex County Municipalities in Watershed

Municipality	Total Premium	A-Zone	Number of Policies	Total Coverage	Total Claims Since 1978	Total Paid Since 1978
EAST BRUNSWICK, TOWNSHIP OF	$ 68,739	21	127	$ 36,080,900	39	$ 156,182
HELMETTA, BOROUGH OF	$ 112,187	76	86	$ 16,911,600	49	$ 338,916
JAMESBURG, BOROUGH OF	$ 49,283	19	41	$ 10,012,100	18	$ 108,854
MONROE, TOWNSHIP OF	$ 122,666	52	248	$ 55,605,900	39	$ 224,720
OLD BRIDGE, TOWNSHIP OF	$ 146,861	81	197	$ 47,563,500	44	$ 261,077
SOUTH RIVER, BOROUGH OF	$281,510	167	199	$43,316,100	92	$755,790
SPOTSWOOD, BOROUGH OF	$ 89,206	63	87	$ 20,169,800	25	$ 196,792

Source: Federal Emergency Management Agency, January 9, 2009

Table 14 - Number and Percent of National Flood Insurance (NFIP) Policies and Proportion of Structures Insured in the Special Hazard Flood Area

Municipality	Municipal-Wide Number of Policies	Number of Structures in Special Flood Hazard Area	Proportion of Structures Insured in Special Flood Hazard Area (Percent)
East Brunswick	121	1043	
Helmetta	86	50	
Jamesburg	37	35	
Monroe	242	0	50
Old Bridge	192	426	
South River	199	167	
Spotswood	85	0	62

Source: Watt, James. March 26, 2009. New Jersey Department of Environmental Protection

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Existing Flood Protection

Existing Dams

There are a number of existing dams in the Watershed and the flood damage vicinity. Table 15 shows the dam name, location in terms of municipality and location, hazard class and height and length. The Bureau of Dam Safety has identified a dam failure event that occurred on September 20, 1989 at Manalapan Lake Dam. Heavy rains overtopped an area adjacent to the dam which caused partial failure and severe flooding downstream. Following the July 2005 flood, dam repairs were completed on January 30, 2007 (Ruggeri, 2009).

Table 15 - Physical Characteristics and Hazard Classification of Dams

Municipality Name	Dam Name	Hazard Class	River/Stream	Height (ft)	Length (feet)
Jamesburg Borough	Manalapan Lake Dam	H	Manalapan Brook	15	213
Jamesburg Borough	Wigwam Brook Dam	O	Wigwam Branch Manalapan Brook	n.a.	n.a.
Spotswood Borough	Devoe Lake Dam	H	Manalapan Brook	15	290
Helmetta Borough	Helmetta Dam	S	Manalapan Brook	7	2000
Monroe Township	Monroe Hunt Pond Dam	L	Manalapan Brook -TR	n.a.	n.a.
Monroe Township	Mount's Mills Dam	L	Matchaponix Brook	n.a.	n.a.
Monroe Township	Glen Rock Dam	L	Wigwam Branch Manalapan Brook	9	250
Monroe Township	Bloomfield Mills #1	L	Branch Manalapan Brook	10	200
Monroe Township	Bloomfield Mills #2	L	Branch Manalapan Brook	12	81

Source: Middlesex County, New Jersey Multi-Jurisdictional Hazard Mitigation Plan and NJ Dams Database.

Hazard Classes (Source: New Jersey Administrative Code – Dam Safety Standards (NJAC: 7-20): Dam Classifications.

H = High Hazard: Loss of life likely (if failure were to occur)

S = Significant Hazard: Loss of life not likely, but the potential for significant property damage.

L = Low Hazard: Loss of life not likely and minimal infrastructure and property damage other than the structure itself.

O = Hazard Removed: Dam at that location that has been taken out of service or breached

The existing dams located in the South River Basin were not designed with capacities for flood control (FEMA, 2009). There are no existing flood protection works in the Boroughs of Jamesburg and Spotswood (FEMA, 2009). The Lake Manalapan Dam is located on the southern corporate limits of Jamesburg with the Township of Monroe. It provides a minimal amount of flood protection to the Borough of Jamesburg as it affects flows on Manalapan Brook (FEMA, 2009).

Dam Gate Management for Flood Damage Reduction

A system for gate management at several dams is in place to reduce downstream flood damages. These dams include Manalapan Lake at Jamesburg, DeVoe Lake and Duhernal Lake at Spotswood. Duhernal Lake is a water supply source for Sayreville and private industries including DuPont. Basically, when the Manalapan Lake gates are opened, the Spotswood Department of Public Works opens the gates on DeVoe Lake provided that the Duhernal Lake gates are opened. Duhernal Lake gates are not opened if there is high tide which occurs immediately downstream of the dam. This gate management system works when there is a relatively small precipitation event and there is no high tide immediately downstream of the Duhernal Lake (Martin, 2010). It does not work when there is a high tide and/or a major precipitation and runoff event. There is a need for County Emergency Management coordination of the gate management for timely opening and closing of the gates.

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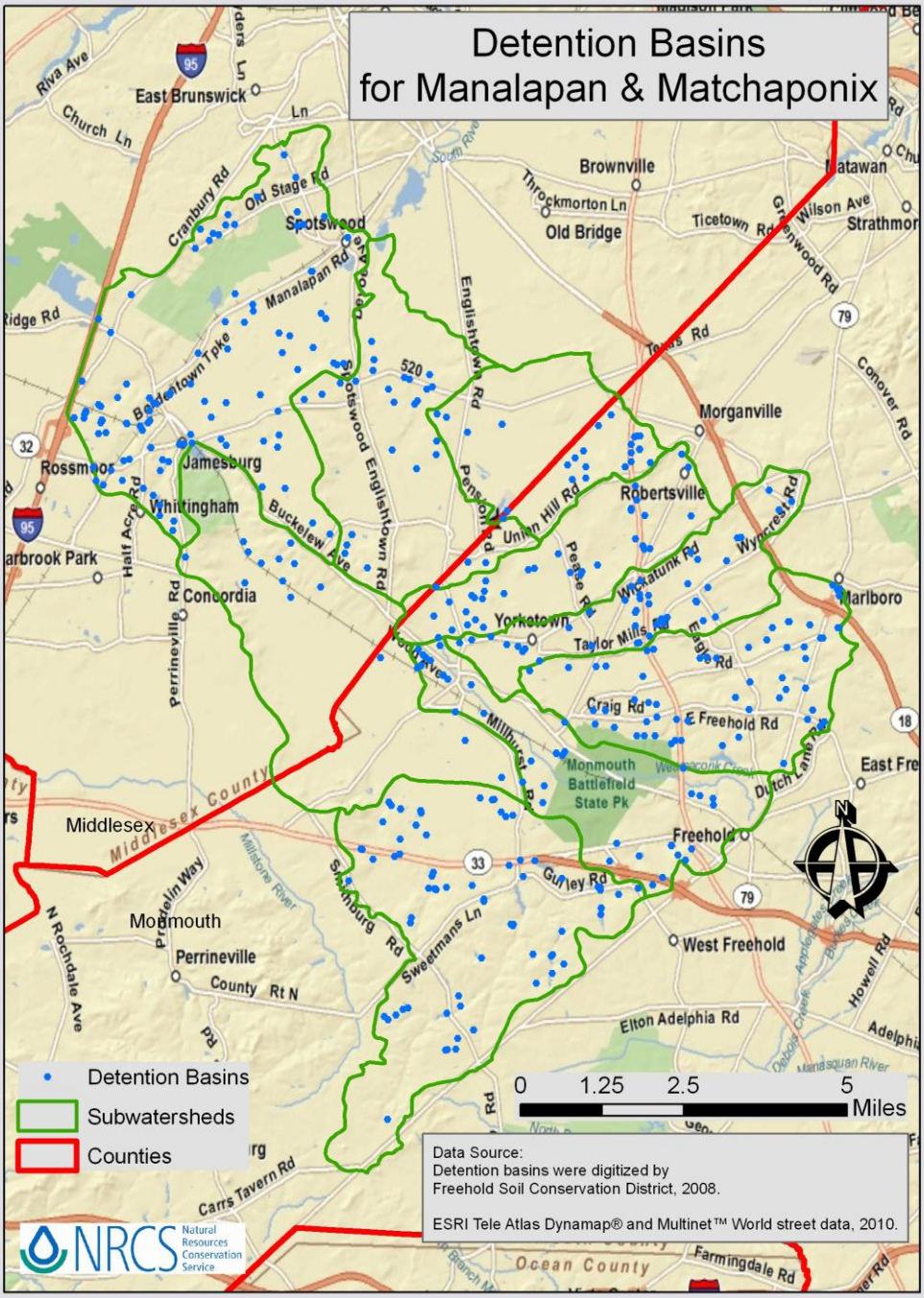
Existing Stormwater Detention

There are approximately 430 detention basins located within these watersheds that have been put in place since 1976 according to records maintained by the Freehold Soil Conservation District. Figure 14 shows the general location of these structures. No analysis of the impact of these structures on downstream flooding is known to have been performed, however, it is expected that these structures have a minimal effect.

Other Existing Flood Protection

There are no other known flood protection measures in the Watershed.

Figure 14 - Detention Basin Location Map



Source: Freehold Soil Conservation District

Thompson Park Lake, Jamesburg, NJ

Helmetta Pond, Helmetta, NJ

DeVoe Lake, Spotswood, NJ

Figure 15 –Present Condition Runoff Curve Number by Subwatershed Map

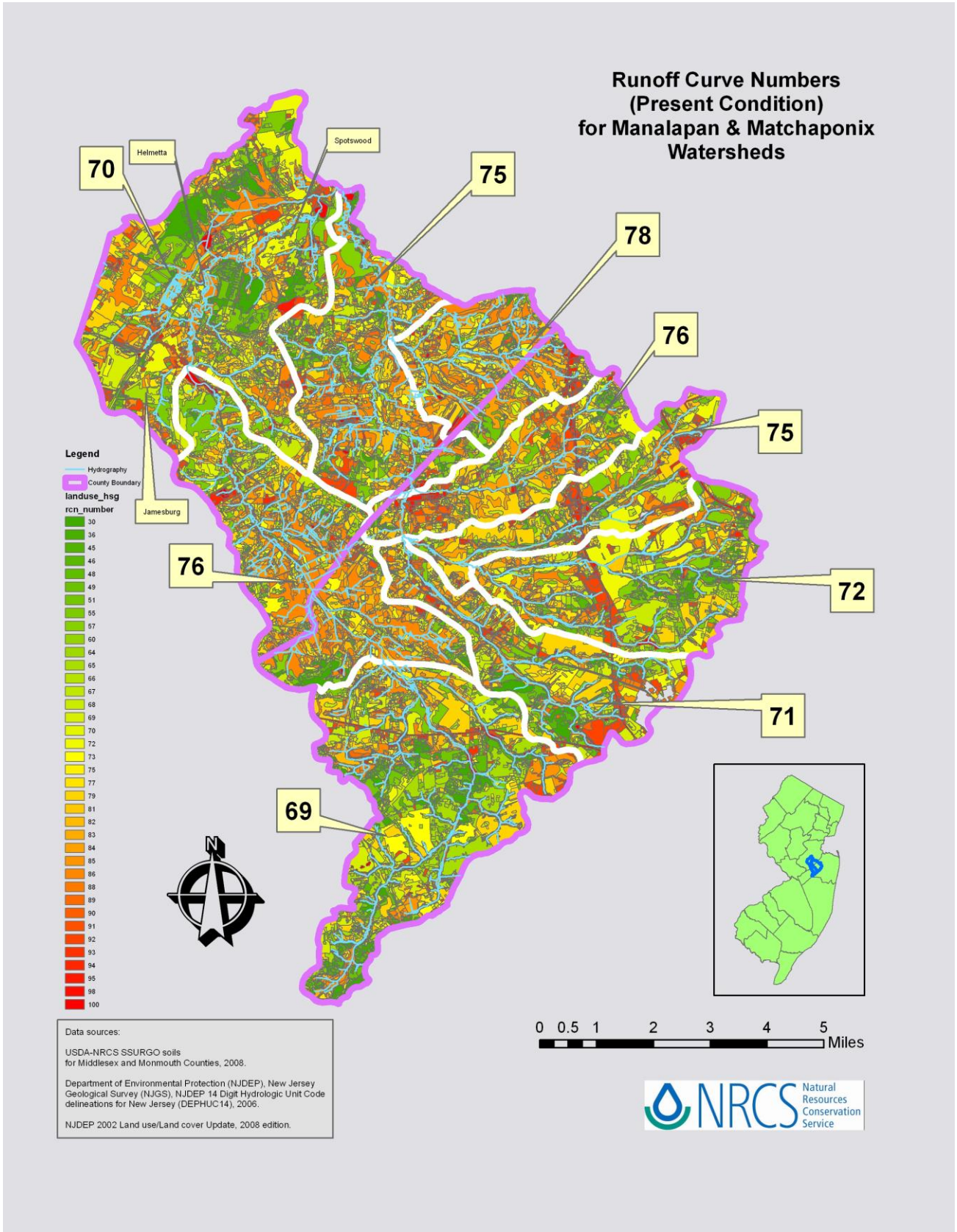


Figure 16 - Present and Future Condition Runoff Curve Number

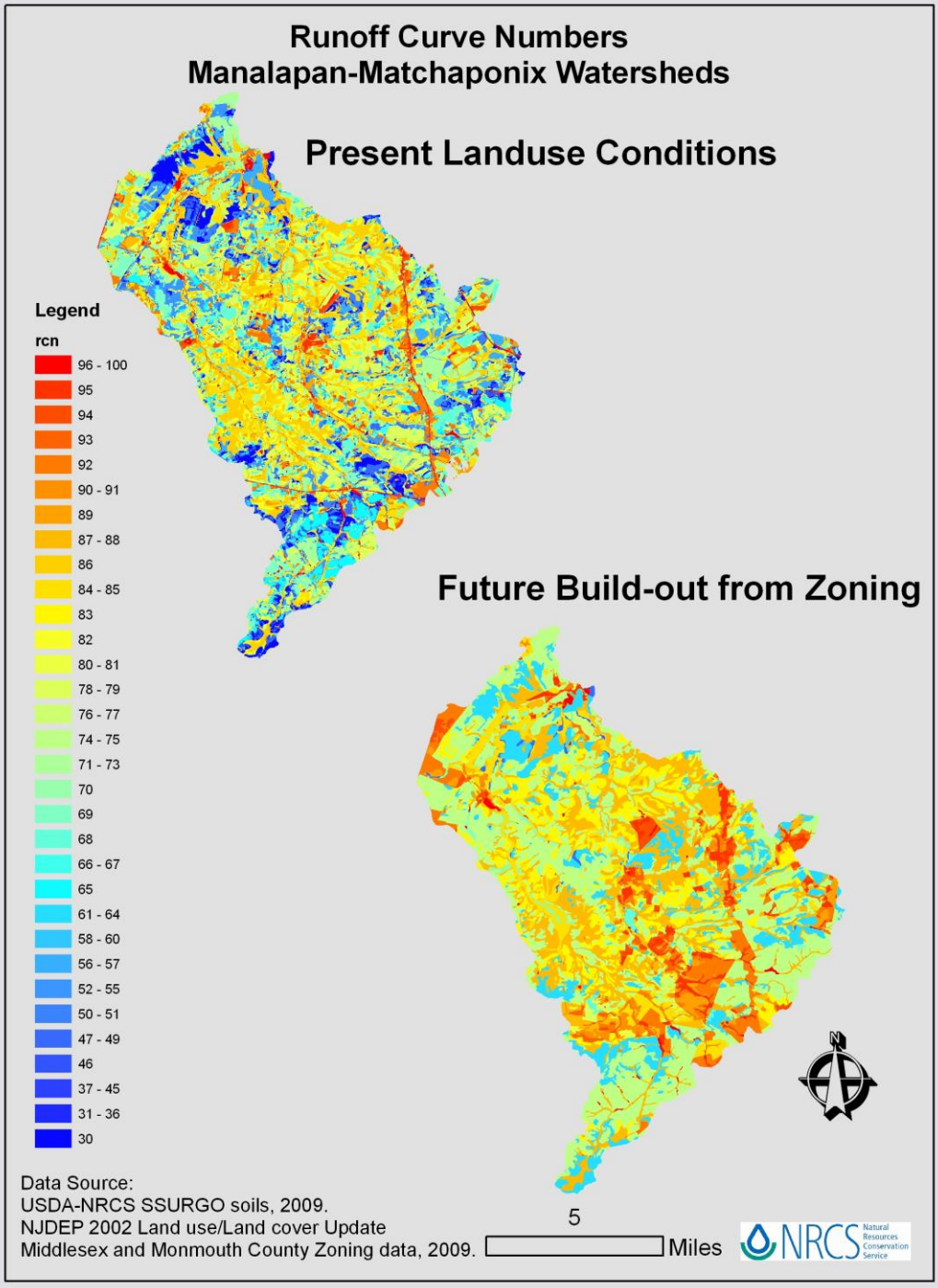
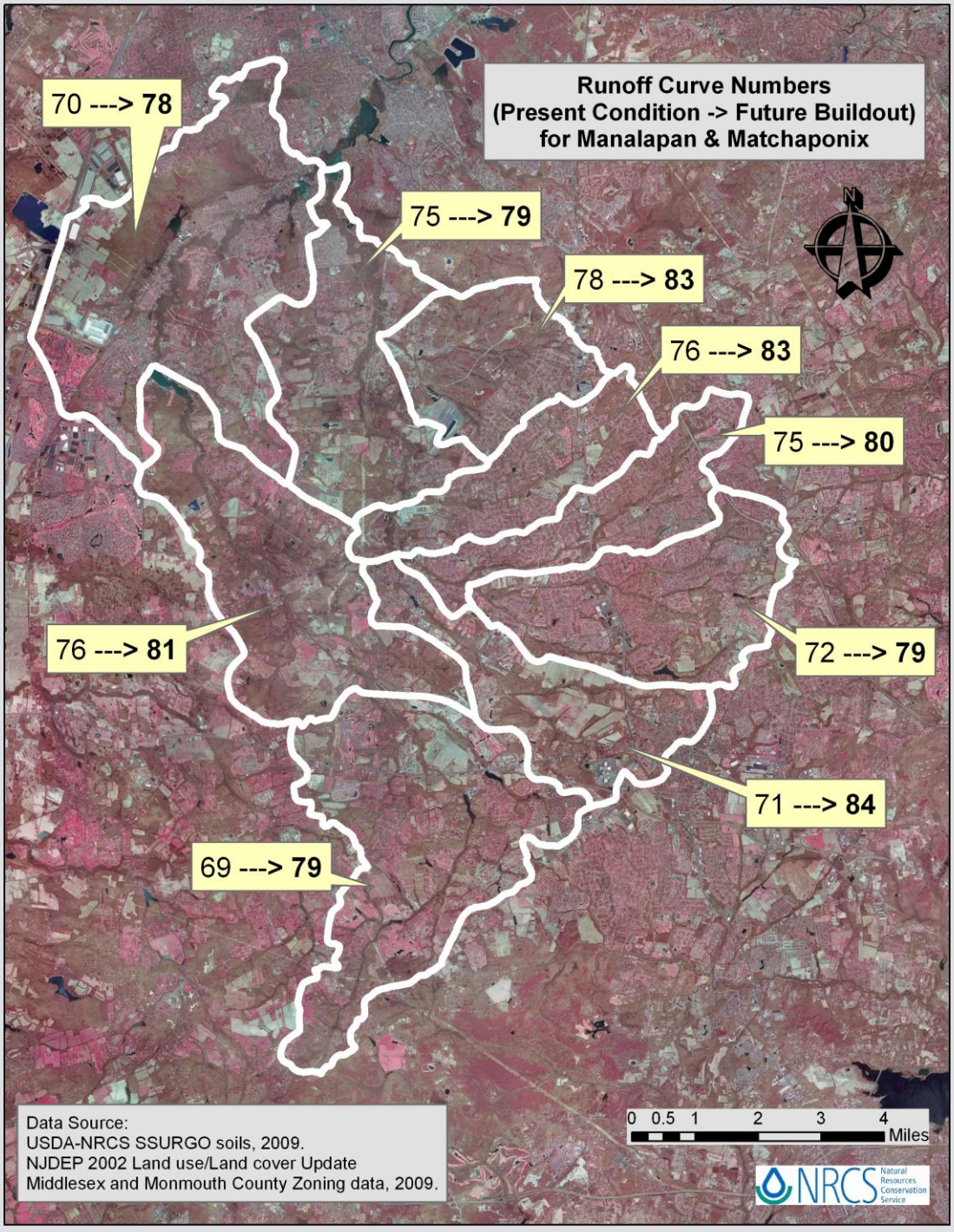


Figure 17 –Comparison of Present Condition to Future Buildout Runoff Curve Number by Subwatershed Map



Runoff Curve Number Discussion

Runoff curve number (RCN) information was developed using the NRCS Technical Release 55 (TR-55) Urban Hydrology for Small Watersheds publication. The RCN values should be seen as a relative index based upon land use and soils data at a scale of 1:24,000. These values are not a substitute for more detailed hydrologic analysis. The runoff curve number is based on a watershed's soil and water conditions which are represented by hydrologic soil group, cover type, treatment and hydrologic condition (SCS, 1986). It should also be noted that "future condition" runoff curve numbers are based upon generalized land use descriptions in municipal zoning data that are not always easily matched up to existing runoff curve tables.
As land cover is changed from a forested land cover to agricultural land cover to suburban/urban land cover the runoff curve number increases. Figure 15 shows the runoff curve number under present land cover conditions by subwatershed. This figure incorporates the existing Monmouth County zoning layer to represent the future condition and assumes that NJDEP Regulated Freshwater Wetlands and Preserved Farmland will remain as such and that the current ratio of commercial and residential land uses in the Middlesex County portion of the Watershed will continue to the build-out condition in Middlesex County.

Figure 16 shows the present land cover conditions compared with the future condition with build-out (based on current zoning).Note that the runoff curve numbers increase moving from the present land cover conditions to the anticipated (with current zoning) future condition. Figure 17 shows the change in the runoff curve number from present to future by subwatershed.

Based on the above future condition there is the potential for an increased amount of stormwater runoff. The nature and extent of future flooding will be dependent on the precipitation amount, timing and duration as well as location within the watersheds, the extent of future development and redevelopment, and the degree to which existing natural and man-made storage can be created, enhanced and protected.

Recommendations

Recommendations for Further Study

1. Conduct a watershed-wide study which would include all municipalities in both Middlesex and Monmouth Counties in order to accurately assess current and future conditions in terms of stormwater runoff and consequent flooding.

2. Conduct a structure-by-structure engineering survey of current and potential flood-vulnerable properties to determine the first floor and basement low opening elevations relative to various predicted (based on the hydrology and hydraulics of the watershed) flood event elevations.

3. Determine the future land use condition by digitizing existing zoning districts of the watershed municipalities.

4. Determine the future runoff curve information (using the future land use condition) to predict the volume of runoff from the watershed and its flood height (hydraulics) relative to the individual first floor and basement low opening elevations.

5. Identify existing water bodies where flood storage can be enhanced without further exacerbating flooding on adjoining, neighboring properties.

Recommendations for Future Action

1. Expand Flood Control Commission to include Monmouth County and its municipalities.

2. Improve communication and coordination among Federal (Corps of Engineers, Federal Emergency Management Agency and Natural Resources Conservation Service), state and local agencies regarding flood mitigation project planning and implementation.

3. Encourage home and business owners to obtain or maintain flood insurance even where their Federally-back mortgage is paid off.

4. Adopt the Community Rating System at the municipal level to provide financial incentives (reduced annual flood insurance premiums) to property owners to reduce their vulnerability to flood damages. Information on the Community Rating System is included in the Appendix.

5. Obtain grants, loans and other financial incentives, where appropriate (based on a structure-by-structure engineering survey) for home and business owners to relocate their water heater, furnace/boiler, electric panel, washer/dryer to a first floor or higher elevation.

6. Elevate, relocate or remove structures, where appropriate (based on a structure-by-structure engineering survey) and the overall benefits are greater than costs, where there are first floor damages.

7. The County Office of Emergency Management should establish, operate and maintain a coordinated system of reservoir gate management (Thompson Park, Helmetta Lake, Devoe Lake, Duhernal Lake and others), recognizing the multiple purposes of various reservoirs, to maximize flood storage capabilities in anticipation of a flood event and minimize flood damages in all affected municipalities.

8. Develop a county-level and multi-jurisdictional integrated flood warning system using US Geological Survey (USGS) stream flow data and National Weather Service flood forecasting capability similar to the Somerset County Flood Information System (http://nj.usgs.gov/publications/FS/fs-090-98/) . In 1978, New Jersey's first local flood-warning system was installed by the USGS in Somerset County. This system consisted of a network of eight streamflow-gaging stations equipped with rain gages and linked by telephone telemetry, and eight auxiliary rain gages. The gages were installed throughout the county to collect rainfall and runoff data that could be used to improve flood-monitoring capabilities and flood-frequency estimates.

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APPENDIX

Appendix A – Municipal Interviews

Manalapan and Matchaponix Creek Watershed
Preliminary Flood Damage and Mitigation Report
Spotswood Borough Information Gathering Meeting
June 17, 2009
Spotswood Borough Hall
2 p.m.

Attendees at the meeting were as follows:

Name	Title	Phone	E-mail
Thomas Barlow	Mayor	732-416-1824	tbarlow@spotswoodboro.com tbarlow200@aol.com
Karl Martin	Police Chief/OEM	732-416-1852	kmartin@spotswoodboro.com
Marge Drozd (by phone)	Councilwoman	732-991-6153	mdrozd@saintpetersuh.com
Ron Fasanello	Business Administrator	732-416-1823	rfasanello@spotswoodboro.com
Bruce Koch	Borough Engineer	732-727-8000 X221	bkoch@cmeusa1.com
Tim Crandall	DPW	732-921-1044	
Greg Westfall	USDA NRCS	732-537-6054	Gregory.westfall@nj.usda.gov

Introduction

Greg noted that the Natural Resources Conservation Service is at the beginning of the planning process here. A report (not a plan) will be produced which will be an inventory and survey of the flooding problem with some preliminary ideas for solutions. A full plan, with fully developed alternative solutions, would require considerable data gathering including engineering surveys, etc.

Problem Identification

Karl Martin spoke of stormwater runoff that has been coming from large developments in Monroe Township along Forge Road. He noted that Spotswood Borough tends to receive a large amount of floodwater from upstream areas. A system of water bodies exists including Thompson Park lake in Jamesburg, cranberry bogs in Helmetta Borough, DeVoe Lake in Spotswood and Duhernal Lake (a water supply reservoir downstream) . The gates on the Thompson Park lake when opened prior to a flood event, help to reduce flooding in Spotswood and Spotswood will usually open the control gates on DeVoe Lake. DeVoe Lake used to be 10-12 feet deep but is now approximately 3 feet deep. Chief Martin described a “dance of the dams” that takes place every time a flood event occurs. The extent of damage is quite dependent on where these gates have been opened prior to the flood event so that there is enough void to handle the additional water. Duhernal Lake is a water supply reservoir for Sayreville.

Chief Martin reported that there was the following precipitation during the 2004 and 2005 flood events:

6-7 inches during a 1-2 hour period in 9/2004

8 inches during a 2 hour period in 7/05
7 inches during 2 days in 4/2007

A review of the FEMA Flood Map revealed that the flood plain delineations are accurate except for Doro Avenue where flooding has occurred.

Mayor Barlow indicated that there had been no flooding prior to the 2004 and 2005 floods. He noted that there had been no first floor damages during either of these events. Spotswood Borough has no agricultural land and has been built-out for the last 10-15 years.

Chief Martin noted that East Brunswick Township has stormwater that enters into a 48 inch stormwater main that comes down Summerhill Road and sometimes cannot be handled.

Mayor Barlow noted that, while people are required to carry flood insurance, it didn't cover the losses to finished basements in the Willard Clark Circle (WCC) vicinity during these floods.

According to Councilwoman Margaret Drozd, Cedar Brook Lane (which adjoins WCC) has had periodic flooding events over the past 50 years, deep enough where people can paddle canoes on it. This has been somewhat mitigated by a drainage pond built by a developer on Crescent Avenue and a deepening and widening of a surrounding stream but it still floods. Recent events where it flooded included those cited by
Chief Martin, and, in addition, a snow melt event approx. 8 years ago.

Chief Martin provided Greg with copies of the Damage Assessment Reports for these floods. Chief Martin will also e-mail Greg copies of pictures from the 2005 flood that both he and Tim Crandall have.

Tim Crandall mentioned that the detention basin near June Road is filling in and causing increased flooding.

<u>Identification of Potential Solutions</u>

The group discussed the options available for reducing flooding here. The following suggestions were made:

1. Desnagging , deepening of Matchaponix and Cedar Brooks from Jamesburg to Helmetta (Karl Martin and Bruce Koch)
2. Dredging of DeVoe Lake to allow for water storage (Tom Barlow)
3. Diversion of cranberry bogs and Cedar Brook water to detention pond in County Park (Karl Martin)

Karl noted that the "dam dance" must be coordinated with tidal influence (below Duhernal Dam) and northeasters.

Greg asked about the size of Devoe Lake. Bruce responded that it is approximately 40 acres. There was discussion regarding having the County Mosquito Commission to do some of the desnagging along stream corridors.

Permitting and then finding funding to do these activities were seen as obstacles to be overcome.

Helmetta Borough Interview on June 29,2009.

Attendees were Ron Sender, County Engineer, and Darren Doran, Borough Emergency Management Coordinator.

Darren stated that there had been an unauthorized dam removed from the cranberry bog upstream of Washington Street. Flood damages have been in basements and a couple of structure's first floors. There is no known engineering survey of structures first floor elevations and low openings to basements. A Remington and Vernick Report was made on October 12, 2004. It was noted that Sewell Peckham (alternate to Flood Control Commission) has photos. Darren stated that the municipality is a Tier A Stormwater Management municipality.

Proposed solutions for reducing flood damage included county purchase of additional cranberry bogs to handle stormflow. It was recommended that, when the tides are high, the water be held in Jamesburg, Helmetta and Spotswood.

South River Borough Interview on July 13, 2009.

Attendees were Andrew J. Salerno, Borough Administrator; and John Trzeciak, Council President with Charles Benn, OEM Coordinator (by phone).

Mr Salerno loaned a copy of the South River, Raritan River Basin, Hurricane & Storm Damage Reduction and Ecosystem Restoration Draft Feasibility Report and Environmental Impact Statement to Greg Westfall. Greg would later met with Charlie Benn on July 29th . Mr. Benn noted that the majority of flooding has been nuisance flooding in yards and basements. He identified the major event as being a December 1992 flood (500 yr event) which required evacuation of 200 people on Ferry Street. Daley's Pond has been preserved for stormwater detention. Charlie identified 32 family structures and 88 others in the flood zone. There are a total of 1080 - 1-4 family homes and 1064 other structures. Mr. Benn identified the Corps project and the on-going Middlesex County All Hazard Plan as the two current actions.

Monroe Township Interview on July 17, 2009.

Attendee was Ernest Feist, Township Engineer.
He noted that the July 17, 2005 flood was due to overland flows not due to the brooks. He noted that flood locations included Rossmoor (2004 and 2005), Old Forge Road and a couple homes first floors. A study was done on the Old Forge Road problem and the recommendation was for improvement projects for retention and efficient removal. Also, Forest Park Terrace had a levee constructed in the 1970s and a pump station in 2008. He noted that the Township has been doing considerable land use planning/zoning as follows:

- Non contiguous cluster
- Significant open space preservation

- Open space tax
- High density residential zoned property

East Brunswick Township Interview on July 28, 2009.

Attendees were Greg Potkulski, Engineer; and John Kosik, OEM Coordinator. It was noted that a study of the upstream gates took place in 1998. It was noted that there was no flooding here prior to 2004 and that the July 2005 flood hit the Bosko Drive residential area near Frost Woods Park.

Old Bridge Township Interview on July 29, 2009.

Attendees were James Cleary, Twp. Engineer; Mike Serdinsky, Zoning Officer; Al Koehl, Asst. Dir. Public Works; Ed Lauer, Dominic Cicio, Pinder Sumal, Assist. Twp. Engineer.

Areas identified as having flooding issues are at Old Matawan Road (businesses at Riverside Plaza), River Street, West Avenue, Central and Riverdale.

The Township participates in the Community Rating System. Key flood events occurred in 1992 (Northeaster' storm) and 1962 Hurricane.

Dominic suggested that there is a need to coordinate all the upstream basin releases with the gates being closed at high tide. He noted that Karl Martin, Spotswood Borough, has details on the procedures.

Jamesburg Borough Interview on August 5, 2009.

Attendee was Tony LaMantia. Four areas in Jamesburg Borough which are areas of concern. They are Wigwam Pond Creek where the dam was removed in 2005 resulting in significant downstream erosion. Manalapan Brook causes flooding on Willow, Pergola, and Church Streets. An eroding stream causing problems on Michael and William Streets. Costco Detention Basin has caused problems on Gatzmer Avenue.

Appendix B – Community Rating System of the National Flood Insurance Program

National Flood Insurance Program
Community Rating System

SUMMARY

http://training.fema.gov/EMIWeb/CRS/

Background: Since 1968 the National Flood Insurance Program (NFIP) has provided federally backed flood insurance to encourage communities to enact and enforce floodplain regulations. The program has been very successful in helping flood victims get back on their feet. There are over 2.2 million policies in force. Since 1978, 350,000 insurance losses have been paid out for a total of $2.5 billion.

In order to be covered by a flood insurance policy, a property must be in a community that participates in the NFIP. To qualify, a community adopts and enforces a floodplain management ordinance to regulate proposed development in flood hazard areas. The objective of the ordinance is to ensure that such development will not aggravate existing flooding conditions and that new buildings will be protected from future flood damage. To date nearly 18,000 communities in the United States participate.

The NFIP has been successful in requiring new buildings to be protected from damage by the 100-year flood. However, the program had few incentives for communities to do more than enforce the minimum regulatory standards. Flood insurance rates had been the same in all participating communities, even though some do much more than regulate construction of new buildings to the national standards. Until now the program did little to recognize or encourage community activities to reduce flood damages to existing buildings, to manage development in areas not mapped by the NFIP, to protect new buildings beyond the minimum NFIP protection level, to help insurance agents obtain flood data, or to help people obtain flood insurance. Because these activities can have a great impact on the insurance premium base, flood damages flood insurance claims, and federal disaster assistance payments, the Federal Insurance Administration (FIA) has implemented the Community Rating System (CRS).

The Concept: Experience since the turn of the century (1900) has shown that fire insurance public protection class given to a community has been a very strong incentive to local officials to maintain or improve their fire protection programs. Local governing boards ensure that their fire alarm communications, water supply and distribution, and overall fire department facilities, including staffing, equipment, training and other items meet or exceed the insurance industry's minimum criteria in order to maintain favorable fire insurance rate classes for their communities. In March 1987, the Federal Insurance Administrator established a Community Rating Task Force with members from FIA, insurance companies, and state and local floodplain managers. The Task Force established three goals for the CRS:

"To encourage, by the use of flood insurance premium adjustments community and state activities beyond those required by the National Flood Insurance Program to:
- Reduce flood losses,
- Facilitate accurate insurance rating, and
- Promote the awareness of flood insurance."

The Task Force worked with the Association of State Floodplain Managers (ASFPM) and ISO/Commercial Risk Services, Inc. (ISO) to develop a rating Schedule and administrative procedures. ISO is a non-profit corporation subscribed to by more than 1300 insurance companies. Among other services, ISO develops and provides advisory fire insurance classification of community fire protection programs. The CRS is the product of three years of development, field testing, critiques and reviews with communities, public interest organizations and ASFPM's technical advisors. The work has been reviewed by 400 professional floodplain managers, 50 public interest organizations, and 41 communities. However, the CRS will always be subject to change and improvement as more experience is gained in administering it and as more is learned about effective floodplain management techniques.

Community Classification: Flood insurance premium credits are available in communities based on their CRS classification. There are ten classes with Class 1 having the greatest premium credit and Class 10 having no premium credit. A community's CRS class is based on the number of credit points calculated for the activities that are undertaken to reduce flood losses, facilitate accurate insurance rating, and promote the awareness of flood insurance. A community is automatically in Class 10 unless it applies for CRS classification and it shows that the activities that it is implementing warrant a better class. The amount of premium credit for each class is published annually by FIA. The CRS rewards those communities that are doing more than the minimum NFIP requirements to their residents prevent or reduce flood losses. The system should also provide an incentive for communities to initiate new flood protection activities.

COMMUNITY CLASSIFICATION POINTS
There are 10 community classes in the Community Rating System. Class 1 communities have the largest premium credit; residents of Class 10 communities receive no premium credit. Communities that do not apply for CRS classification are Class 10 communities.
The insurance premium credit is based on whether a property is in or out of the Special Flood Hazard Area (SFHA), i.e., the A and V Zones as shown on the community's Flood Insurance Rate Map (FIRM). The premium credit for properties in the SFHA increases according to the community's CRS class. The credit for properties outside the SFHA is lower for Class 1–8 communities because premiums in these areas are already relatively low and can be lowered further through the Preferred Risk Policy. Also, most activities undertaken to qualify for those classes are implemented only in the floodplain. Because areas designated as A99 and AR Zones already receive an insurance premium reduction, these zones get the same premium reduction as non-SFHA areas. A community's classification is based on the community total points (cT) as calculated on activity worksheet AW-720. The qualifying community total points, CRS classes, and flood insurance premium credits are shown below:

Credit Points (cT)
CRS Class
Premium Discount
4,500+
1
45%
4,000–4,499
2
40%
3,500–3,999

3
35%
3,000–3,499
4
30%
2,500–2,999
5
25%
2,000–2,499
6
20%
1,500–1,999
7
15%
1,000–1,499
8
10%
500–999
9
5%
0–499
10
0
SFHA (Zones A, AE, A1–A30, V, V1–V30, AO, and AH): Credit varies depending on class.
SFHA (Zones A99, AR, AR/A, AR/AE, AR/A1–A30, AR/AH, and AR/AO): 10% credit for Classes 1–6; 5% credit for Classes 7–9.
Non-SFHA (Zones B, C, X, D): 10% credit for Classes 1–6; 5% credit for Classes 7–9.
Preferred Risk Policies are not eligible for CRS premium discounts. The Preferred Risk Policy does not receive premium rate credits under the CRS because it already has a lower premium than other policies. Preferred Risk Policies are available only in B, C, and X Zones for properties that are shown to have a minimal risk of flood damage. Premium reductions are subject to change.

Operation: Community application for CRS classification is voluntary. Any community in full compliance with the rules and regulations of the NFIP may apply for a CRS classification. The applicant community submits documentation that it is implementing one or more of the activities recognized in the CRS Schedule. The Schedule identifies 18 creditable activities, organized under four categories in Sections 300-600: Public Information, Mapping and Regulations, Flood Damage Reduction, and Flood Preparedness. They are listed on the last page of this Summary. The Schedule assigns credit points based on how well an activity affects the three goals of the CRS. Communities are welcome to propose alternative approaches in their applications. Some of the activities may be implemented by the state or a regional district rather than at the local level. For example, some states have disclosure laws that may meet the credit criteria of Activity 340 – Flood Hazard Disclosure. In such cases, any community in those states or districts could receive credit points if the community applies for a CRS classification and if the state or district program is, in fact, being implemented in the community.

The Regional Office of the Federal Emergency Management Agency (FEMA) and the State NFIP Coordinator review and comment on the application. FIA verifies the information and the community's implementation of the activities. FIA sets the credit to be granted and notifies the community, the state, the insurance companies, and other appropriate parties. The community's activities and performance are reviewed periodically. If it is not properly or fully implementing the credited activities, its credit points and possibly, its CRS classification, will be revised. A community may add or drop creditable activities each year. Credit criteria for each activity may also change as more experience is gained in implementing, observing and measuring the activities.

Costs and Benefits: No fee is charged for a community to apply for classification or to participate in the CRS. Because there may be a cost to implement the creditable activities, some communities may be concerned whether the cost of initiating a new activity will be offset by the flood insurance premium credits. It is important to note that reduction in flood insurance rates is only one of the rewards communities receive from undertaking the activities credited under the Community Rating System. Others include increased public safety, reduction of damages to property and public infrastructure, avoidance of economic disruption and losses, reduction of human suffering, and protection of the environment. Communities should prepare and implement those activities that best deal with the local flood problem, not just those items that are listed in the Schedule. In considering whether to undertake a new activity, communities will want to consider all of the benefits the activity will provide (in addition to insurance premium credits) in order to determine whether it is cost effective.

Activities Credited Under the Community Rating System
(Sections 100 and 200 cover other topics in the CRS Schedule)
300 Public Information Activities
310 Elevation Certificate: Maintain FEMA's Elevation Certificate and make copies available to inquirers.
320 Map Determinations: Respond to inquiries for Flood Insurance Rate Map zone and flood data.
330 Outreach Projects: Advise residents about the flood hazard, flood insurance, and flood protection measures.
340 Hazard Disclosure: Advise potential purchasers of flood-prone Property about the hazard.
350 Flood Protection Library: Maintain and publicize a library of references on flood insurance and flood protection.
360 Flood Protection Assistance: Provide direct advice to property Owners desiring to protect themselves from flooding.
400 Mapping and Regulatory Activities
410 Additional Flood Data: Develop new flood elevations, floodway delineations, wave heights, or other regulatory flood hazard data.
420 Open Space Preservation: Credit is provided according to the amount of vacant floodplain that is kept free of buildings and filling.
430 Higher Regulatory Standards: Regulation that require new development to be protected to a level greater than the NFIP rules.
440 Flood Data Maintenance: Make the community's floodplain maps more current, useful, or accurate.

Appendix C – Flood Damage Prevention Ordinances

3. be certified by a registered professional engineer or architect that the design and methods of construction are in accordance with accepted standards of practice for meeting the applicable provisions of this subsection. Such certification shall be provided to the official as set forth in Section 4.3-3(2).

5.2-3. Mobile Homes.

1. Mobile homes shall be anchored in accordance with Section 5.1-1(2).

2. All manufactured homes to be placed or substantially improved within an area of special flood hazard shall be elevated on a permanent foundation such that the top of the lowest floor is at or above the base flood elevation.

5.3. FLOODWAYS.

Located within areas of special flood hazard established in Section 3.2 are areas designated as floodways. Since the floodway is an extremely hazardous area due to the velocity of flood waters which carry debris, potential projectiles, and erosion potential, the following provisions apply:

1. Prohibit encroachments, including fill, new construction, substantial improvements, and other development unless a technical evaluation demonstrates that encroachments shall not result in any increase in flood levels during the occurrence of the base flood discharge.

2. If Section 5.3(1) is satisifed, all new construction and substantial improvements shall comply with all applicable flood hazard reduction provision of Section 5.0 PROVISIONS FOR FLOOD HAZARD REDUCTION.

3. Prohibit the placement of any mobile homes, except in any existing mobile home park or existing mobile home subdivision where Section 5.3(1) is satisfied.

4. Base flood elevation data shall be provided for subdivision proposals and other proposed development which contain at least 50 lots or 5 acres (whichever is less).

5.1-5. Enclosure Openings. [Added 4-15-87 by Ord. No. 87-829]

For all new construction and substantial improvements, fully enclosed areas below the lowest floor that are subject to flooding shall be designed to automatically equalize hydrostatic flood forces on exterior walls by allowing for the entry and exit of floodwaters. Designs for meeting this requirement must either be certified by a registered professional engineer or architect or must meet or exceed the following minimum criteria: A minimum of two openings having a total net area of not less than one square inch for every square foot of enclosed area subject to flooding shall be provided. The bottom of all openings shall be no higher than one foot above grade. Openings may be equipped with screens, louvers, or other coverings or devices provided that they permit the automatic entry and exit of floodwaters.

5.2. SPECIFIC STANDARDS.

In all areas of special flood hazards where base flood elevation data have been provided as set forth in Section 3.2, BASIS FOR ESTABLISHING THE AREAS OF SPECIAL FLOOD HAZARD or in Section 4.3-2, Use of Other Base Flood Data, the following standards are required:

5.2-1. Residential Construction.

New construction and substantial improvement of any residential structure shall have the lowest floor, including basement, elevated to or above base flood elevation.

5.2-2. Nonresidential Construction.

New construction and substantial improvement of any commercial, industrial or other nonresidential structure shall either have the lowest floor, including basement, elevated to the level of the base flood elevation; or, this new construction and substantial improvement together with attendant utility and sanitary facilities, shall:

1. be floodproofed so that below the base flood level the structure is watertight with walls substantially impermeable to the passage of water;

2. have structural components capable of resisting hydrostatic and hydrodynamic loads and effects of buoyancy; and

2. All Manufactured homes shall be anchored to resist flotation, collapse or lateral movement. Methods of anchoring may include, but are not to be limited to, use of over-the top or frame ties or ground anchors. This requirement is in addition to applicable State and local anchoring requirements for resisting wind forces.

5.1-2. Construction Materials and Methods.

1. All new construction and substantial improvements shall be constructed with materials and utility equipment resistant to flood damage.

2. All new construction and substantial improvements shall be constructed using methods and practices that minimize flood damage.

5.1-3. Utilities. [Amended 4-15-87 by Ord. No. 87-829]

1. All new and replacement water supply systems shall be designed to minimize or eliminate infiltration of flood waters into the system;

2. New and replacement sanitary sewage systems shall be designed to minimize or eliminate infiltration of flood waters into the systems and discharge from the systems into flood waters; and

3. On-site waste disposal systems shall be located to avoid impairment to them or contamination from them during flooding.

4. Electrical, heating, ventilation, plumbing and air-conditioning equipment and other service facilities shall be designed and/or located so as to prevent water from entering or accumulating within the components during conditions of flooding.

5.1-4. Subdivision Proposals.

1. All subdivision proposals shall be consistent with the need to minimize flood damage;

2. All subdivision proposals shall have public utilities and facilities such as sewer, gas, electrical, and water systems located and constructed to minimize flood damage;

3. All subdivision proposals shall have adequate drainage provided to reduce exposure to flood damage; and

2. Variances may be issued for the reconstruction, rehabilitation or restoration of structures listed on the National Register of Historic Places or the State Inventory of Historic Places, without regard to the procedures set forth in the remainder of this section.

3. Variances shall not be issued within any designated floodway if any increase in flood levels during the base flood discharge would result.

4. Variances shall only be issued upon a determination that the variance is the minimum necessary, considering the flood hazard, to afford relief.

5. Variances shall only be issued upon:

   a. a showing of good and sufficient cause;

   b. a determination that failure to grant the variance would result in exceptional hardship to the applicant; and

   c. a determination that the granting of a variance will not result in increased flood heights, additional threats to public safety, extraordinary public expense, create nuisances, cause fraud on or victimization of the public as identified in Section 4.4-1(4), or conflict with existing local laws or ordinances.

6. Any applicant to whom a variance is granted shall be given written notice that the structure will be permitted to be built with a lowest floor elevation below the base flood elevation and that the cost of flood insurance will be commensurate with the increased risk resulting from the reduced lowest floor elevation.

§ 228-234. Provisions for Flood Hazard Reduction.

5.1. GENERAL STANDARDS.

In all areas of special flood hazards the following standars are required:

5.1-1. Anchoring. [Amended 4-15-87 by Ord. No. 87-829]

1. All new construction and substantial improvements shall be anchored to prevent flotation, collapse, or lateral movement of the structure.

c. the susceptibility of the proposed facility and its contents to flood damage and the effect of such damage on the individual owner;

d. the importance of the services provided by the proposed facility to the community;

e. the necessity to the facility of a waterfront location, where applicable;

f. the availability of alternative locations for the proposed use which are not subject to flooding or erosion damage;

g. the compatibility of the proposed use with existing and anticipated development;

h. the relationship of the proposed use to the comprehensive plan and flood plain management program of that area;

i. the safety of access to the property in times of flood for ordinary and emergency vehicles;

j. the expected heights, velocity, duration, rate of rise, and sediment transport of the flood waters and the effects of wave action, if applicable, expected at the site; and

k. the costs of providing governmental services during and after flood conditions, including maintenance and repair of public utilities and facilities such as sewer, gas, electrical, and water systems, and streets and bridges.

5. Upon consideration of the factors of Section 4.4-1(4) and the purposes of this ordinance, the Planning Board may attach such conditions to the granting of variances as it deems necessary to further the purposes of this ordinance.

6. The Township Engineer shall maintain the records of all appeal actions, including technical information, and report any variances to the Federal Insurance Administration upon request.

4.4-2. Conditions for Variances.

1. Generally, variances may be issued for new construction and substantial improvements to be erected on a lot of one-half acre or less in size contiguous to and surrounded by lots with existing structures constructed below the base flood level, providing items A-K in Section 4.4-1(4) have been fully considered. As the lot size increases beyond the one-half acre, the technical justification required for issuing the variance increases.

3. Maintain for public inspection all records pertaining to the provisions of this ordinance.

4.3-4. Alteration of Watercourses.

1. Cause notification to adjacent communities and require application to be made to the New Jersey Department of Environmental Protection prior to any alteration or relocation of a watercourse, and have submitted evidence of such notification to the Federal Insurance Administration.

2. Require that maintenance is provided within the altered or relocated portion of said watercourse so that the flood carrying capacity is not diminished.

4.3-5. Interpretation of FIRM Boundaries.

Make interpretations where needed, as to the exact location of the boundaries of the areas of special flood hazards (for example, where there appears to be a conflict between a mapped boundary and actual field conditions). The person contesting the location of the boundary shall be given a reasonable opportunity to appeal the interpretation as provided in Section 4.4.

4.4. VARIANCE PROCEDURE.

4.4-1. Appeal Board.

1. The Planning Board as established by the Township of East Brunswick shall hear and decide appeals and request for variances from the requirement of this ordinance.

2. The Planning Board shall hear and decide appeals when it is alleged there is an error in any requirement, decision, or determination made by the Township Engineer in the enforcement or administration of this ordinance.

3. Those aggrieved by the decision of the Planning Board, or any taxpayer, may appeal such decision to the Superior Court of New Jersey, as provided in the statute.

4. In passing upon such applications, the Planning Board shall consider all technical evaluations, all relevant factors, standards specified in other sections of this ordinance, and:

   a. the danger that materials may be swept onto other lands to the injury of others;

   b. the danger to life and property due to flooding or erosion damage;

4.2. DESIGNATION OF THE TOWNSHIP ENGINEER.

The Township Engineer is hereby appointed to administer and implement this ordinance by granting or denying development permit applications in accordance with its provisions.

4.3. DUTIES AND RESPONSIBILITIES OF THE TOWNSHIP ENGINEER.

Duties of the Township Engineer shall include, but not be limited to:

4.3-1. Permit Review.

1. Review all development permits to determine that the permit requirements of this ordinance have been satisfied.

2. Review all development permits to determine that all necessary permits have been obtained from those Federal, State or local governmental agencies from which prior approval is required.

3. Review all development permits to determine if the proposed development is located in the floodway. If located in the floodway, assure that the encroachment provisions of Section 5.3(1) are met.

4.3-2. Use of Other Base Flood Data. [Amended 4-15-87 by Ord. No. 87-829]

When base flood elevation data has not been provided in accordance with Section 3.2, BASIS FOR ESTABLISHING THE AREAS OF SPECIAL FLOOD HAZARD, the (local administrator) shall obtain, review, and reasonably utilize any base flood elevation and floodway data available from a Federal, State or other source, in order to administer Sections 5.2-1, SPECIFIC STANDARDS, Residential Construction, and 5.2-2, SPECIFIC STANDARDS, Nonresidential Construction.

4.3-3. Information to be Obtained and Maintained.

1. Obtain and record the actual elevation (in relation to mean sea level) of the lowest habitable floor (including basement) of all new or substantially improved structures, and whether or not the structure contains a basement.

2. For all new substantially improved floodproofed structures:

   a. verify, by means of a survey sealed by a land surveyor paid for by the application, and record the actual elevation (in relation to mean sea level); and

   b. maintain the floodproofing certifications required in Section 4.1(3).

2. Liberally construed in favor of the governing body; and,

3. Deemed neither to limit nor repeal any other powers granted under State statutes.

3.6. WARNINGS AND DISCLAIMER OF LIABILITY.

The degree of flood protection required by this ordinance is considered reasonable for regulatory purposes and is based on scientific and engineering considerations. Larger floods can and will occur on rare occasions. Flood heights may be increased by man-made or natural causes. This ordinance does not imply that land outside the area of special flood hazards or uses permitted within such areas will be free from flooding or flood damages. This ordinance shall not create liability on the part of the Township of East Brunswick, any officer or employee thereof or the Federal Insurance Administration, for any flood damages that result from reliance on this ordinance or any administrative decision lawfully made thereunder.

§ 228-233. Administration.

4.1. ESTABLISHMENT OF DEVELOPMENT PERMIT.

A Development Permit shall be obtained before construction or development begins within any area of special flood hazard established in Section 3.2. Application for a Development Permit shall be made on forms furnished by the Township Engineer and may include, but not be limited to; plans in duplicate drawn to scale showing the nature, location, dimensions, and elevations of the area in question; existing or proposed structures, fill, storage of materials, drainage facilities; and the location of the foregoing.

Specifically, the following information is required:

1. Elevation in relation to mean sea level, of the lowest floor (including basement) of all structures;

2. Elevation in relation to mean sea level to which any structure has been floodproofed;

3. Certification by a registered professional engineer or architect that the floodproofing methods for any nonresidential structure meet the floodproofing criteria in Section 5.2-2; and,

4. Description of the extent to which any watercourse will be altered or relocated as a result of proposed development.

§ 228-232. General Provisions.

3.1. LANDS TO WHICH THIS ORDINANCE APPLIES.

This ordinance shall apply to all areas of special flood hazards within the jurisdiction of East Brunswick Township, Middlesex County, New Jersey.

3.2. BASIS FOR ESTABLISHING THE AREAS OF SPECIAL FLOOD HAZARD.

The area of special flood hazard identified by the Federal Insurance Administration in a scientific and engineering report entitled "The Flood Insurance Study for the Township of East Brunswick, New Jersey", dated July, 1981, with accompanying Flood Insurance Rate Maps and Flood Boundary-Floodway Maps is hereby adopted by reference and declared to be a part of this ordinance. The Flood Insurance Study is on file in offices of Planning and Engineering. [Amended 4-24-89 by Ord. No. 89-12]

3.3. PENALTIES FOR NONCOMPLIANCE.

No structure or land shall hereafter be constructed, located, extended, converted, or altered without full compliance with the terms of this ordinance and other applicable regulations. Violation of the provisions of this ordinance by failure to comply with any of its requirements (including violations of conditions and safeguards established in connection with conditions) shall constitute a misdemeanor. Any person who violates this ordinance or fails to comply with any of its requirements shall upon conviction thereof be fined not more than $500.00 or imprisoned for not more than 90 days, or both, for each violation, and in addition shall pay all costs and expenses involved in the case. Nothing herein contained shall prevent the Township of East Brunswick from taking such other lawful action as is necessary to prevent or remedy any violation.

3.4. ABROGATION AND GREATER RESTRICTIONS.

This ordinance is not intended to repeal, abrogate, or impair any existing easement, covenants, or deed restrictions. However, where this ordinance and other ordinance, easement, covenant, or deed restriction conflict or overlap, whichever imposes the more stringent restrictions shall prevail.

3.5. INTERPRETATION.

In the interpretation and application of this ordinance, all provisions shall be:

1. Considered as minimum requirements;

"Start of construction" for other than new construction or substantial improvements under the Coastal Barrier Resources Act (P.L. 97-348) includes substantial improvement and means the date the building permit was issued, provided the actual start of construction, repair, reconstruction, placement, or other improvement was within 180 days of the permit date. The actual start means either the first placement of permanent construction of a structure on a site such as the pouring of a slab or footings, the installation of piles, the construction of columns, or any work beyond the stage of excavation; or the placement of a manufactured home on a foundation. Permanent construction does not include land preparation, such as clearing, grading and filling nor does it include the installation of streets and/or walkways; nor does it include excavation for a basement, footings, piers, or foundations or the erection of temporary forms; nor does it include the installation on the property of accessory buildings, such as garages or sheds not occupied as dwelling units or not part of the main structure.

"Structure" means a walled and roofed building, a mobile home, or a gas or liquid storage tank, that is principally above ground.

"Substantial improvement" means any repair, reconstruction, or improvement of a structure, the cost of which equals or exceeds 50 percent of the market value of the structure either:

1. before the improvement or repair is started, or
2. if the structure has been damaged and is being restored, before the damage occurred.

For the purposes of this definition "substantial improvement" is considered to occur when the first alteration of any wall, ceiling, floor, or other structural part of the building commences, whether or not that alteration affects the external dimensions of the structure.

The term does not, however, include either:

1. any project for improvement of a structure to comply with existing State or local health, sanitary, or safety code specifications which are solely necessary to assure safe living conditions, or
2. any alteration of a structure listed on the National Register of Historic Places or a State Inventory of Historic Places.

"Variance" means a grant of relief from the requirements of this ordinance which permits construction in a manner that would otherwise be prohibited by this ordinance.

Areas of Coastal High Hazard "elevated building" also includes a building otherwise meeting the definition of "elevated building" even though the lower area is enclosed by means of breakaway walls.

"Flood" or "flooding" means a general and temporary condition of partial or complete inundation of normally dry land areas from:

1. The overflow of inland or tidal waters and/or

2. The unusual and rapid accumulation or runoff of surface waters from any source.

"Flood Insurance Rate Map" (FIRM) means the official map on which the Federal Insurance Administration has delineated both the areas of special flood hazards and the risk premium zones applicable to the community.

"Flood Insurance Study" means the official report provided in which the Federal Insurance Administration has provided flood profiles, as well as the Flood Boundary-Floodway Map and the water surface elevation of the base flood.

"Floodway" means the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than 0.2 foot.

"Lowest Floor" means the lowest floor of the lowest enclosed area (including basement). An unfinished or flood resistant enclosure, useable solely for the parking of vehicles, building access or storage in an area other than a basement is not considered a building's lowest floor provided that such enclosure is not built so to render the structure in violation of other applicable non-elevation design requirements.

"Manufactured home" means a structure, transportable in one or more sections, which is built on a permanent chassis and is designed for use with or without a permanent foundation when connected to the required utilities. For flood plain management purposes the term "manufactured home" also includes park trailers, travel trailers and other similar vehicles placed on a site for greater than 180 consecutive days. For insurance purposes the term "manufactured home" does not include park trailers, travel trailers and other similar vehicles.

"Manufactured home park or manufactured home subdivision" means a parcel (or contiguous parcels) of land divided into two or more manufactured home lots for rent or sale.

"New construction" means structures for which the "start of construction" commenced on or after the effective date of this ordinance.

& 228-231. Definitions. [Amended 4-25-87 by Ord. No. 87-829]

Unless specifically defined below, words or phrases used in this ordinance shall be interpreted so as to give them the meaning they have in common usage and to give this ordinance its most reasonable application.

"Appeal" means a request for a review of the Township Engineer or Director of Planning and Community Development interpretation of any provision of this ordinance or a request for a variance.

"Area of shallow flooding" means a designated AO Zone on the Flood Insurance Rate Map (FIRM). The base flood depths range from one to three feet; a clearly defined channel does not exist; the path of flooding is unpredictable and indeterminate; and, velocity flow may be evident.

"Areas of special flood hazard" means the land in the flood plain within a community subject to a one percent or greater chance of flooding in any given year.

"Base flood" means the flood having a one percent chance of being equalled or exceeded in any given year.

"Basement" means any area of the building having its floor subgrade (below grade level) on all sides.

"Breakaway wall" means a wall that is not part of the structural support of the building and is intended through its design and construction to collapse under specific lateral loading forces without causing damage to the elevated portion of the building or supporting foundation system.

"Development" means any man-made change to improved or unimproved real estate, including but not limited to buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling operations located within the area of special flood hazard.

"Elevated building" means a non-basement building (i) built in the case of a building in a Area of Special Flood Hazard to have the top of the elevated floor or in the case of a building in a Coastal High Hazard Area to have the bottom of the lowest horizontal structural member of the elevated floor elevated above the ground level by means of piling, columns (posts and piers), or shear walls parallel to the flow of the water and (ii) adequately anchored so as not to impair the structural integrity of the building during a flood of up to the magnitude of the base flood. In an Area of Special Flood Hazard "elevated building" also includes a building elevated by means of fill or solid foundation perimeter walls with openings sufficient to facilitate the unimpeded movement of flood waters. In

1. To protect human life and health;

2. To minimize expenditure of public money for costly flood control projects;

3. To minimize the need for rescue and relief efforts associated with flooding and generally undertaken at the expense of the general public;

4. To minimize prolonged business interruption;

5. To minimize damage to public facilities and utilities such as water and gas mains, electric, telephone and sewer lines, streets and bridges located in areas of special flood hazard;

6. To help maintain a stable tax base by providing for the second use and development of areas of special flood hazard so as to minimize future flood blight areas;

7. To insure that potential buyers are notified that property is in an areas of special flood hazard; and

8. To ensure that those who occupy the areas of special flood hazard assume responsibility for their actions.

1.4. METHODS OF REDUCING FLOOD LOSSES.

In order to accomplish its purposes, this ordinance includes methods and provisions for:

1. Restricting or prohibiting uses which are dangerous to health, safety, and property due to water or erosion hazards, or which result in damaging increases in erosion or in flood heights or velocities;

2. Requiring that uses vulnerable to floods, including facilities which serve such uses, be protected against flood damage at the time of initial construction;

3. Controlling the alteration of natural flood plains, stream channels, and natural protective barriers, which help accommodate or channel flood waters;

4. Controlling filling, grading, dredging, and other development which may increase flood damage; and

5. Preventing or regulating the construction of flood barriers which will unnaturally divert flood waters or which may increase flood hazards in other areas.

to promote the public health, safety and general welfare of its citizenry. Therefore, the Township Council of East Brunswick, New Jersey does ordain as follows:

1.2. **FINDINGS OF FACT.**

1. The flood hazard areas of East Brunswick are subject to periodic innundation which results in loss of life and property, health and safety hazards, disruption of commerce and governmental services, extraordinary public expenditures for flood protection and relief, and impairment of the tax base, all of which adversely affect the public health, safety and general welfare.

2. These flood losses are caused by the cumulative effect of obstructions in areas of special flood hazards which increase flood heights and velocities, and when inadequately anchored, damage uses in other areas. Uses that are inadequately floodproofed, elevated or otherwise protected from flood damage also contribute to the flood loss.

1.3. **STATEMENT OF PURPOSE.**

It is the purpose of this ordinance to promote the public health, safety, and general welfare, and to minimize public and private losses due to flood conditions in specific areas by provisions designed:

(Cont'd on page 23002)

D. Upon completion of the necessary remedial work, a revised sound level report as indicated in Subsection A shall be submitted. Once the sound levels have been reduced to the acceptable standards set forth in Subsection A, development approval may be issued.

This section shall not prohibit the designation or approval of any green belt or open space in any area in which the sound level exceeds 65 dBA Leq regardless of whether such green belt or open space is open to public use, provided that no recreational improvement or facility is constructed thereon.

E. As a condition of approval, the Planning Board or Zoning Board of Adjustment shall require the submission of future certified reports prior to the issuance of certificates of occupancy to verify that the condition in Section 5b has been met. These reports shall contain, at a minimum, twenty-four (24) hours of sound testing in the bedrooms to determine that the Leq is below the levels established in Section 5b, except that the permissible interior night levels shall be reduced an additional ten (10) decibels.

F. Upon issuance of a certificate of occupancy and the transfer of the property by deed, the property owner of record shall become responsible for the maintenance of all sound attenuation devices on that property.

The developer shall attach to all contracts of sale a map which designates all areas within the development where noise levels exceed 65 dBA Leq. The lot subject to sale shall be clearly delineated. Such map shall be approved by the Township Engineer.

G. For the purposes of this section, all measurements and designations of sound levels shall be expressed as a percentile of Leq sound pressure levels unless the Township specifically approves an alternate.

All measurements to determine if sound is within the levels set forth herein shall be carried out utilizing a sound level meter which meets the specifications established by ANSI.

ARTICLE XXVII
Flood Damage Prevention Ordinance Statutory Authorization, Findings of Fact Purpose and Objectives
[Amended 12-14-81 by Ord. No. 81-422]

§ 228-230. Flood Damage Prevention Ordinance.

1.1. STATUTORY AUTHORIZATION.

The Legislature of the State of New Jersey has delegated the reponsibility to local governmental units to adopt regulations designed

Chapter 36

FLOOD DAMAGE PREVENTION

ARTICLE I
General Provisions

ARTICLE II
Scope and Interpretation; Penalties

ARTICLE III
Administration

[HISTORY: Adopted by the Mayor and Council of the Borough of Helmetta 10-10-84.[1] Amendments noted where applicable.]

GENERAL REFERENCES

Moving of buildings — See Ch. 27.
Uniform construction codes — See Ch. 29A.
Housing standards — See Ch. 39.
Land use procedures — See Ch. 40.

Be it ordained by the Mayor and Council of the Borough of Helmetta in the County of Middlesex and State of New Jersey:

ARTICLE I
General Provisions

§ 36-1. Statutory authorization. [Amended 10-19-88]

The Legislature of the State of New Jersey has in N.J.S.A. 40:48-1 et seq. delegated the responsibility to local governmental units to adopt regulations designed to promote the public health, safety and general welfare of its citizenry. Therefore, the Mayor and Council of the Borough of Helmetta of New Jersey does ordain as follows.

[1] Editor's Note: Former Ch. 36, Flood Damage Control, was superseded 10-10-84 by this ordinance.

§ 36-2. Findings of fact.

A. The flood hazard areas of the Borough of Helmetta are subject to periodic inundation which results in loss of life and property, health and safety hazards, disruption of commerce and governmental services, extraordinary public expenditures for flood protection and relief and impairment of the tax base, all of which adversely affects the public health, safety and general welfare.

B. These flood losses are caused by the cumulative effect of obstructions in areas of special flood hazard which increase flood heights and velocities and, when inadequately anchored, damage uses in other areas. Uses that are inadequately floodproofed, elevated or otherwise protected from flood damage also contribute to the flood loss.

§ 36-3. Purpose.

It is the purpose of this chapter to promote the public health, safety and general welfare and to minimize public and private losses due to flood conditions in specific areas by provisions designed:

A. To protect human life and health.

B. To minimize expenditure of public money for costly flood control projects.

C. To minimize the need for rescue and relief efforts associated with flooding and generally undertaken at the expense of the general public.

D. To minimize prolonged business interruptions.

E. To minimize damage to public facilities and utilities, such as water and gas mains, electric, telephone and sewer lines, streets and bridges located in areas of special flood hazard.

F. To help maintain a stable tax base by providing for the second use and development of areas of special flood hazard so as to minimize future flood blight areas.

G. To ensure that potential buyers are notified that property is in an area of special flood hazard.

H. To ensure that those who occupy the areas of special flood hazard assume responsibility for their actions.

§ 36-4. Methods of reducing flood losses.

In order to accomplish its purposes, this chapter includes methods and provisions for:

A. Restricting or prohibiting uses which are dangerous to health, safety and property due to water or erosion hazards or which result in damaging increases in erosion or in flood heights or velocities.

B. Requiring that uses vulnerable to floods, including facilities which serve such uses, be protected against flood damage at the time of initial construction.

C. Controlling the alteration of natural floodplains, stream channels and natural protective barriers which help accommodate or channel floodwaters.

D. Controlling filling, grading, dredging and other development which may increase flood damage.

E. Preventing or regulating the construction of flood barriers which will unnaturally divert flood waters or which may increase flood hazards in other areas.

§ 36-5. Definitions. [Amended 10-19-88]

Unless specifically defined below, words or phrases used in this chapter shall be interpreted so as to give them the meaning they have in common usage and to give this chapter its most reasonable application.

APPEAL — A request for a review of the Construction Code Official's interpretation of any provision of this chapter or a request for a variance.

AREA OF SHALLOW FLOODING — A designated AO or VO Zone on the Flood Insurance Rate Map (FIRM). The base flood depths range from one (1) to three (3) feet; a clearly

defined channel does not exist; the path of flooding is unpredictable and indeterminate; and velocity flow may be evident.

AREA OF SPECIAL FLOOD HAZARD — The land in the floodplain within a community subject to a one-percent or greater chance of flooding in any given year.

BASE FLOOD — The flood having a one-percent chance of being equaled or exceeded in any given year.

BASEMENT — Any area of the building having its floor subgrade (below ground level) on all sides.

BREAKAWAY WALL — A wall that is not part of the structural support of the building and is intended through its design and construction to collapse under specific lateral loading forces without causing damage to the elevated portion of the building or supporting foundation system.

COASTAL HIGH-HAZARD AREA — The area subject to high-velocity waters, including but not limited to hurricane wave wash or tsunamis. The area is designated on a FIRM as Zone V1 - 30.

DEVELOPMENT — Any man-made change to improved or unimproved real estate, including but not limited to buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling operations located within the area of special flood hazard.

ELEVATED BUILDING — A nonbasement building built, in the case of a building, in an area of special flood hazard to have the top of the elevated floor or, in the case of a building in a coastal high-hazard area, to have the bottom of the lowest horizontal structural member of the elevated floor elevated above the ground level by means of piling, columns (posts and piers) or shear walls parallel to the flow of the water and adequately anchored so as not to impair the structural integrity of the building during a flood of up to the magnitude of the base flood. In an area of special flood hazard, "elevated building" also includes a building elevated by means of fill or solid foundation perimeter walls with openings sufficient to

facilitate the unimpeded movement of floodwaters. In areas of coastal high-hazard, "elevated building" also includes a building otherwise meeting the definition of "elevated building," even though the lower area is enclosed by means of breakaway walls.

FLOOD or FLOODING — A general and temporary condition of partial or complete inundation of normally dry land areas from the overflow of inland or tidal waters and/or the unusual and rapid accumulation or runoff of surface waters from any source.

FLOOD INSURANCE RATE MAP (FIRM) — The official map on which the Federal Insurance Administration has delineated both the areas of special flood hazard and the risk premium zones applicable to the community.

FLOOD INSURANCE STUDY — The official report provided in which the Federal Insurance Administration has provided flood profiles, as well as the Flood Boundary and Floodway Map and the water surface elevation of the base flood.

FLOODWAY — The channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than two-tenths (0.2) foot.

LOWEST FLOOR — The lowest floor of the lowest enclosed area, including basement. An unfinished or flood-resistant enclosure, usable solely for the parking of vehicles, building access or storage in an area other than a basement is not considered a building's "lowest floor," provided that such enclosure is not built so as to render the structure in violation of other applicable nonelevation design requirements.

MANUFACTURED HOME — A structure, transportable in one (1) or more sections, which is built on a permanent chassis and is designed for use with or without a permanent foundation when connected to the required utilities. For floodplain management purposes, the term "manufactured home" also includes park trailers, travel trailers and other similar vehicles placed on a site for greater than one hundred

eighty (180) consecutive days. For insurance purposes, the term "manufactured home" does not include park trailers, travel trailers and other similar vehicles.

MANUFACTURED HOME PARK or MANUFACTURED HOME SUBDIVISION — A parcel or contiguous parcels of land divided into two (2) or more manufactured home lots for rent or sale.

NEW CONSTRUCTION — Structures for which the start of construction commenced on or after the effective date of this chapter.

SAND DUNES — Naturally occurring accumulations of sand in ridges or mounds landward of the beach.

START OF CONSTRUCTION [For other than new construction or substantial improvements under the Coastal Barrier Resources Act (P.L. 97-348)] — Includes substantial improvement and means the date the building permit was issued, provided that the actual "start of construction," repair, reconstruction, placement or other improvement was within one hundred eighty (180) days of the permit date. The "actual start" means either the first placement of permanent construction of a structure on a site such as the pouring of a slab or footings, the installation of piles, the construction of columns or any work beyond the stage of excavation; or the placement of a manufactured home on a foundation. Permanent construction does not include land preparation, such as clearing, grading and filling, nor does it include the installation of streets and/or walkways; nor does it include excavation for a basement, footings, piers or foundations or the erection of temporary forms; nor does it include the installation on the property of accessory buildings, such as garages or sheds not occupied as dwelling units or not part of the main structure.

STRUCTURE — A walled and roofed building, a manufactured home or a gas or liquid storage tank that is principally above ground.

SUBSTANTIAL IMPROVEMENT — Any repair, reconstruction or improvement of a structure, the cost of which

equals or exceeds fifty percent (50%) of the market value of the structure either before the improvement or repair is started or, if the structure has been damaged and is being restored, before the damage occurred. For the purposes of this definition, "substantial improvement" is considered to occur when the first alteration of any wall, ceiling, floor or other structural part of the building commences, whether or not that alteration affects the external dimensions of the structure. The term does not, however, include either any project for improvement of a structure to comply with existing state or local health, sanitary or safety code specifications which are solely necessary to assure safe living conditions or any alteration of a structure listed on the National Register of Historic Places or a State Inventory of Historic Places.

VARIANCE — A grant of relief from the requirements of this chapter which permits construction in a manner that would otherwise be prohibited by this chapter.

ARTICLE II
Scope and Interpretation; Penalties

§ 36-6. Scope.

This chapter shall apply to all areas of special flood hazard within the jurisdiction of the Borough of Helmetta.

§ 36-7. Basis for establishing areas of special flood hazard.

The areas of special flood hazard identified by the Federal Insurance Administration in a scientific and engineering report entitled the "Flood Insurance Study for the Borough of Helmetta," dated April 16, 1984, or the most current Federal Emergency Management Act Federal Insurance Study with accompanying Flood Insurance Rate Maps and Flood Boundary - Floodway Maps is hereby adopted by reference and declared to be a part of this chapter. The Flood Insurance Study is on file at Borough Hall, 60 Main Street, Helmetta, New Jersey.

§ 36-8. Violations and penalties; other remedies.

No structure or land shall hereafter be constructed, located, extended, converted or altered without full compliance with the terms of this chapter and other applicable regulations. Violation of the provisions of this chapter by failure to comply with any of its requirements, including violations of conditions and safeguards established in connection with conditions, shall constitute a misdemeanor. Any person who violates this chapter or fails to comply with any of its requirements shall, upon conviction thereof, be fined not more than two hundred dollars ($200.) or imprisoned for not more than ten (10) days, or both, for each violation, and in addition shall pay all costs and expenses involved in the case. Nothing herein contained shall prevent the Borough of Helmetta from taking such other lawful action as is necessary to prevent or remedy any violation.

§ 36-9. Abrogation and greater restrictions.

This chapter is not intended to repeal, abrogate or impair any existing easements, covenants or deed restrictions. However, where this chapter and other ordinances, easements covenants or deed restrictions conflict or overlap, whichever imposes the more stringent restrictions shall prevail.

§ 36-10. Interpretation.

In the interpretation and application of this chapter, all provisions shall be:

A. Considered as minimum requirements.

B. Liberally construed in favor of the governing body.

C. Deemed neither to limit nor repeal any other powers granted under state statutes.

§ 36-11. Warning and disclaimer of liability.

The degree of flood protection required by this chapter is considered reasonable for regulatory purposes and is based on scientific

and engineering considerations. Larger floods can and will occur on rare occassions. Flood heights may be increased by man-made or natural causes. This chapter does not imply that land outside the areas of special flood hazard or uses permitted within such areas will be free from flooding or flood damages. This chapter shall not create liability on the part of the Borough of Helmetta any officer or employee thereof or the Federal Insurance Administration, for any flood damages that result from reliance on this chapter or any administrative decision lawfully made thereunder.

ARTICLE III
Administration

§ 36-12. Development permit required; application. [Amended 10-19-88]

A development permit shall be obtained before construction or development begins within any area of special flood hazard established in § 36-7. Application for a development permit shall be made on forms furnished by the Construction Official and may include, but not be limited to plans, in duplicate, drawn to scale, showing the nature, location, dimensions and elevations of the area in question, existing or proposed structures, fill, storage of materials, drainage facilities and the location of the foregoing. Specifically, the following information is required:

A. The elevation, in relation to mean sea level, of the lowest floor, including basement, of all structures.

B. The elevation, in relation to mean sea level, to which any structure has been floodproofed.

C. Certification by a registered professional engineer or architect that the floodproofing methods for any nonresidential structure meet the floodproofing criteria in § 36-18B.

D. A description of the extent to which any watercourse will be altered or relocated as a result of the proposed development.

§ 36-13. Construction Code Official designated.

The Construction Code Official is hereby appointed to administer and implement this chapter by granting or denying development permit applications in accordance with its provisions.

§ 36-14. Duties and responsibilities of Construction Code Official. [Amended 10-19-88]

The duties of the Construction Code Official shall include, but not be limited to:

A. Permit review.

(1) To review all development permits to determine that the permit requirements of this chapter have been satisfied.

(2) To review all development permits to determine that all necessary permits have been obtained from those federal, state or local governmental agencies from which prior approval is required.

(3) To review all development permits in the coastal high-hazard area of the area of special flood hazard to determine if the proposed development alters sand dunes so as to increase potential flood damage.

(4) To review all development permits to determine if the proposed development is located in the floodway and assure that the encroachment provisions of § 36-19A are met.

(5) To review plans for walls to be used to enclose space below the base flood level in accordance with the provisions herein.

B. Use of other base flood and floodway data. When base flood elevation data has not been provided in accordance with § 36-7, Basis for establishing areas of special flood hazard, the Construction Code Official shall obtain, review and reasonably utilize any base flood elevation and floodway data available from a federal, state or other source in order to administer § 36-18A, Specific standards, Residential construction and § 36-18B, Specific standards, Nonresidential construction.

C. Information to be obtained and maintained.

(1) To obtain and record the actual elevation, in relation to mean sea level, of the lowest floor, including basement, of all new or substantially improved structures and whether or not the structure contains a basement.

(2) For all new substantially improved floodproofed structures:

(a) To verify and record the actual elevation, in relation to mean sea level; and

(b) To maintain the floodproofing certifications required in § 36-12C.

(3) In coastal high-hazard areas, certification shall be obtained from a registered professional engineer or architect that the provisions of this chapter are met.

(4) To maintain for public inspection all records pertaining to the provisions of this chapter.

D. Alteration of watercourse.

(1) To notify adjacent communities and the New Jersey Department of Environmental Protection, Bureau of Floodplain Management prior to any alteration or relocation of a watercourse, and to submit evidence of such notification to the Federal Insurance Administration.

(2) To require that maintenance is provided within the altered or relocated portion of said watercourse so that the flood-carrying capacity is not diminished.

E. Interpretation of FIRM boundaries. To make interpretation where needed, as to the exact location of the boundaries of the areas of special flood hazard (for example, where there appears to be a conflict between a mapped boundary and

actual field conditions). The person contesting the location of the boundary shall be given a reasonable opportunity to appeal the interpretation as provided in §§ 36-15 and 36-16.

§ 36-15. Board of Appeals.

A. The Mayor and Council shall hear and decide appeals and requests for variances from the requirements of this chapter.

B. The Mayor and Council shall hear and decide appeals when it is alleged that there is an error in any requirement, decision or determination made by the Construction Code Official in the enforcement or administration of this chapter.

C. Those aggrieved by the decision of the Mayor and Council, or any taxpayer, may appeal such decision to the New Jersey Superior Court, as provided in New Jersey Statutes and New Jersey Rules of Court.

D. In passing upon such applications, the Mayor and Council shall consider all technical evaluations, all relevant factors, standards specified in other sections of this chapter and:

(1) The danger that materials may be swept onto other lands to the injury of others.

(2) The danger to life and property due to flooding or erosion damage.

(3) The susceptibility of the proposed facility and its contents to flood damage and the effect of such damage on the individual owner.

(4) The importance of the services provided by the proposed facility to the community.

(5) The necessity to the facility of a waterfront location, where applicable.

(6) The availability of alternative locations for the proposed use which are not subject to flooding or erosion damage.

(7) The compatibility of the proposed use with existing and anticipated development.

(8) The relationship of the proposed use to the Comprehensive Plan and floodplain management program of that area.

(9) The safety of access to the property in times of flood for ordinary and emergency vehicles.

(10) The expected heights, velocity, duration, rate of rise and sediment transport of the floodwaters and the effects of wave action, if applicable, expected at the site.

(11) The costs of providing governmental services during and after flood conditions, including maintenance and repair of public utilities and facilities, such as sewer, gas, electrical and water systems and streets and bridges.

E. Upon consideration of the factors of § 36-15D and the purposes of this chapter, the Mayor and Council may attach such conditions to the granting of variances as it deems necessary to further the purposes of this chapter.

F. The Construction Code Official shall maintain the records of all appeal actions, including technical information, and report any variances to the Federal Insurance Administration upon request.

§ 36-16. Conditions for variances.

A. Generally, variances may be issued for new construction and substantial improvements to be erected on a lot of one-half (½) acre or less in size contiguous to and surrounded by lots with existing structures constructed below the base flood level, provided that Subsections D(1) through D(11) of § 36-15 have been fully considered. As the lot size increases beyond the one-half (½) acre, the technical justification required for issuing the variance increases.

B. Variances may be issued for the reconstruction, rehabilitation or restoration of structures listed on the National Register of

Historic Places or the State Inventory of Historic Places, without regard to the procedures set forth in the remainder of this section.

C. Variances shall not be issued within any designated floodway if any increase in flood levels during the base flood discharge would result.

D. Variances shall only be issued upon a determination that the variance is the minimum necessary, considering the flood hazard, to afford relief.

E. Variances shall only be issued upon:

(1) A showing of good and sufficient cause.

(2) A determination that failure to grant the variance would result in exceptional hardship to the applicant.

(3) A determination that the granting of a variance will not result in increased flood heights, additional threats to public safety, extraordinary public expense, create nuisances, cause fraud on or victimization of the public as identified in § 36-15D or conflict with existing local laws or ordinances.

F. Any applicant to whom a variance is granted shall be given written notice that the structure will be permitted to be built with a lowest floor elevation below the base flood elevation and that the cost of flood insurance will be commensurate with the increased risk resulting from the reduced lowest floor elevation.

ARTICLE IV
Provisions for Flood Hazard Reduction
[Amended 10-19-88]

§ 36-17. General standards.

In all areas of special flood hazard, the following standards are required:

A. Anchoring.

(1) All new construction and substantial improvements shall be anchored to prevent flotation, collapse or lateral movement of the structure.

(2) All manufactured homes shall be anchored to resist flotation, collapse or lateral movement. Methods of anchoring may include, but are not limited to, use of over-the-top or frame ties to ground anchors. This requirement is in addition to applicable state and local anchoring requirements for resisting wind forces.

B. Construction materials and methods.

(1) All new construction and substantial improvements shall be constructed with materials and utility equipment resistant to flood damage.

(2) All new construction and substantial improvements shall be constructed using methods and practices that minimize flood damage.

C. Utilities.

(1) All new and replacement water supply systems shall be designed to minimize or eliminate infiltration of floodwaters into the system.

(2) New and replacement sanitary sewage systems shall be designed to minimize or eliminate infiltration of floodwaters into the systems and discharge from the systems into floodwaters.

(3) On-site waste disposal systems shall be located to avoid impairment to them or contamination from them during flooding.

(4) Electrical, heating, ventilation, plumbing and air-conditioning equipment and other service facilities shall be designed and/or located so as to prevent water from entering or accumulating within the components during conditions of flooding.

D. Subdivision proposals.

(1) All subdivision proposals shall be consistent with the need to minimize flood damage.

(2) All subdivision proposals shall have public utilities and facilities, such as sewer, gas, electrical and water systems located and constructed to minimize flood damage.

(3) All subdivision proposals shall have adequate drainage provided to reduce exposure to flood damage.

(4) Base flood elevation data shall be provided for subdivision proposals and other proposed developments which contain at least fifty (50) lots or five (5) acres, whichever is less.

E. Enclosure openings. For all new construction and substantial improvements, fully enclosed areas below the lowest floor that are subject to flooding shall be designed to automatically equalize hydrostatic flood forces on exterior walls by allowing for the entry and exit of floodwaters. Designs for meeting this requirement must either be certified by a registered professional engineer or architect or must meet or exceed the following minimum criteria:

(1) A minimum of two (2) openings having a total net area of not less than one (1) square inch for every square foot of enclosed area subject to flooding shall be provided.

(2) The bottom of all openings shall be no higher than one (1) foot above grade.

(3) Openings may be equipped with screens, louvers or other coverings or devices, provided that they permit the automatic entry and exit of floodwaters.

§ 36-18. Specific standards.

In all areas of special flood hazard where base flood elevation data have been provided as set forth in § 36-7, Basis for establishing the areas of special flood hazard, or in § 36-14B, Use of other base flood and floodway data, the following standards are required:

A. Residential construction. New construction and substantial improvement of any residential structure shall have the lowest floor, including basement, elevated to or above base flood elevation.

B. Nonresidential construction. New construction and substantial improvement of any commercial, industrial or other nonresidential structure shall either have the lowest floor, including basement, elevated to the level of the base flood elevation or:

(1) Be floodproofed so that below the base flood level the structure is watertight with walls substantially impermeable to the passage of water;

(2) Have structural components capable of resisting hydrostatic and hydrodynamic loads with effects of buoyancy; and

(3) Be certified by a registered professional engineer or architect that the design and methods of construction are in accordance with accepted standards of practice for meeting the applicable provisions of this subsection. Such certification shall be provided to the official as set forth in § 36-14C(2).

C. Manufactured homes.

(1) Manufactured homes shall be anchored in accordance with § 36-17A(2).

(2) All manufactured homes to be placed or substantially improved within an area of special flood hazard shall be elevated on a permanent foundation such that the top of the lowest floor is at or above the base flood elevation.

§ 36-19. Floodways.

Located within areas of special flood hazard, established in § 36-7, are areas designated as floodways. Since the floodway is an extremely hazardous area due to the velocity of floodwaters which carry debris, potential projectiles and erosion potential, the following provisions apply:

A. Prohibited are encroachments, including fill, new construction, substantial improvements and other development unless a technical evaluation demonstrates that encroachment shall not result in any increase in flood levels during the occurrence of the base flood discharge.

B. If § 36-19A is satisfied, all new construction and substantial improvements shall comply with all applicable flood hazard reduction provisions of this Article.

C. In all areas of special flood hazard in which base flood elevation data has been provided and no floodway has been designated, the cumulative effect of any proposed development, when combined with all existing and anticipated development, shall not increase the water surface elevation of the base flood more than two-tenths (0.2) of a foot at any point.

Jamesburg Borough

CHAPTER XVIII

FLOOD DAMAGE PREVENTION

18-1 Statutory Authorization, Findings of Facts, Purpose of Objectives.

18-1.1 Statutory Authorization. The Legislature of the State of New Jersey has, in NJSA 40:48-1, et seq. and NJSA 40:55D-1, et seq. delegated the responsibility to local governmental units to adopt regulations designed to promote the public health, safety, and general welfare of it's citizenry. Therefore, the Borough council of the Borough of Jamesburg, Middlesex County, State of New Jersey does ordain as follows:

18-1.2 Findings of Fact.

a. The flood hazard areas of the borough are subject to periodic inundation which results in loss of life and property, health and safety hazards, disruption of commerce and flood protection and relief, and impairment of the tax base, all of which adversely affect the public health, safety and general welfare.

b. These flood losses are caused by ;the cumulative effect of obstructions in areas of special flood hazards which increase flood heights and velocities, and when inadequately anchored, damage uses in other areas. Uses that are inadequately floodproofed, elevated or otherwise protected from flood damage also contribute to the flood loss.

18-1.3 Statement of Purpose. It is the purpose of this ordinance to promote the public health, safety and general welfare, and to minimize public and private losses due to flood conditions in specific areas by provisions designed:

a. To protect human life and health

b. To minimize expenditure of public money for costly flood control projects

c. To minimize the need for rescue and relief efforts associated with flooding and generally undertaken at the expense of the general public

d. To minimize prolonged business interruptions

e. To minimize damage to public facilities and utilities such as water and gas mains, electric, telephone and sewer lines, streets and bridges located in areas of special flood hazard

f. To help maintain a stable tax base by providing for the second use and development of areas of special flood hazard so as to minimize future flood blight areas

g. To insure that potential buyers are notified that property is in an area of special flood hazard

h. To ensure that those who occupy the areas of special flood hazard assume responsibility for their actions.

18-1.4 Methods of Reducing Flood Losses. In order to accomplish its purpose, this ordinance includes methods and provisions for:

a. Restricting or prohibiting uses which are dangerous to health, safety, and property due to water or erosion hazards, or which result in damaging increases in erosion or in flood heights or velocities.

b. Requiring that uses vulnerable to floods, including facilities which serve such uses, be protected against flood damage at the time of initial construction.

c. Controlling the alteration of natural flood plains, stream channels, and natural protective barriers, which help accommodate or channel flood waters.

d. Controlling, filling, grading, dredging, and other development which may increase flood damage.

e. Preventing or regulating the construction of flood barriers which will unnaturally divert flood waters or which may increase flood hazards in other areas.

18.2 Definitions

Unless specifically defined below, words or phrases used in this ordinance shall be interpreted so as to give them the meaning they have in common usage and to give this ordinance its most reasonable application.

a. "Appeal" means a request for a review of the borough engineer's interpretations of any provision of this ordinance or a request for a variance.

b. "Area of shallow flooding" means a designated AO Zone on the Flood Insurance Rate Map (FIRM). The base flood depths range from one to three feet; a clearly defined channel does not exist; the path of flooding is unpredictable and indeterminate; and velocity flow may be evident.

c. "Area of special flood hazard" means the land in the flood plain within a community subject to a one percent or greater chance of flooding in any given year.

d. "Base Flood" means the flood having a one percent chance of being equalled or exceeded in any given year.

e. "Basement" means any area of the building having its floor subgrade (below ground level) on all sides.

f. "breakaway Wall" means a wall that is not part of the structural support of the building and is intended through its design and construction to collapse under specific lateral loading forces without causing damage to the elevated portion of the building or supporting foundation system.

g. Development" means the division of a parcel of land into two or more parcels, the construction, reconstruction, conversion, enlargement of any building or other structure or of any mining, excavation or landfill and any use or change in the use of any building or other structure or land or extension of use of land for which permission may be required.

h. "Elevated building" means a non-basement building (a) built in the case of a building in an area of special flood hazard to have the top[of the elevated floor or in the case of a building in a coastal high hazard area to have the bottom of the lowest horizontal structural member of the elevated floor elevated above the ground level by means of piling, columns (posts and piers), or shear walls parallel to the flow of the water and (b) adequately anchored so as not to impair the structural integrity of the building during a flood or up to the magnitude of the base flood. In an area of special flood hazard "elevated building" also includes a building elevated by means of fill or solid foundation perimeter walls with openings sufficient to facilitate the unimpeded movement of flood waters.In areas of Costal High Hazard "elevated building" also includes a building otherwise meeting the definition of "elevated building" even though the lower is enclosed by means of breakaway walls.

i. "Existing mobile home park or mobile home subdivision" means a parcel (or contiguous parcels) of land divided into two or more mobile home lots for rent or sale for which the construction of facilities for servicing the lot on which the mobile home is to be affixed (including at a minimum, the installation of utilities, either final site grading or the pouring of concrete pads, and the construction of streets) is completed before the effective date of this ordinance.

j. "Expansion to an existing mobile home park or mobile home subdivision" means the preparation of additional sites by the construction of facilities for servicing the lots on which the mobile homes are to be affixed (including the installation of utilities, either final site grading or pouring of concrete or the construction of streets).

k. "Flood" or "flooding" means a general and temporary condition of partial or complete inundation of normally dry land areas from:

1. The overflow of inland or tidal waters and/or

2. The unusual and rapid accumulation or runoff of surface waters form any source.

l. "Flood Insurance Rate Map" (FIRM) means the official map on which the Federal Insurance Administration has delineated both the areas of special flood hazards and the risk premium zones applicable to the community.

m. "Flood Insurance Study" means the official report provided in which the Federal Insurance Administration has provided flood profiles, as well as the Flood Boundary-Floodway Map and the water surface elevation of the base flood.

n. "Floodway" means the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing ;the water surface elevation more than 0.2 foot (two-tenths of a foot).

o. "Lowest Floor" means the lowest floor of the lowest enclosed area (including basement). An unfinished or flood resistant enclosure, usable solely for the parking of vehicles, building access or storage in an area other than a basement is not considered a building's floor provided that such enclosure is not built so to render the structure in violation of other applicable non-elevation design requirements.

p. "Manufactured Home" means a structure, transportable in one or more sections, which is built on a permanent chassis and is designed for use with or without a permanent foundation when connected to the required utilities. For flood plain management purposes the term "manufactured home" also includes park trailers, travel trailers and other similar vehicles placed on a site for greater than 180 consecutive days. For insurance purposes the term "manufactured homes" does not include park trailers, travel trailers and other similar vehicles.

q. "Manufactured Home Part or Manufactured Home Subdivision" means a parcel (or contiguous parcels) of land divided into two or more manufactured home lots for rent or sale.

r. "New Construction" means structures for which the "start of construction" commenced on or after the effective date of this ordinance.

s. "Start of Construction" means the first placement of permanent construction of a structure (other than a mobile home) on a site, such as the pouring of slabs or footings or any work beyond the stage of excavation. Permanent construction does not include land preparation, such as clearing, grading, and filling, nor does it include the installation of streets and/or walkways; nor does it include the excavation of a basement, footings, piers or foundations or the erection of temporary forms; nor does it include the installation on the property of accessory

buildings, such as garages or sheds not occupied as dwelling units or not as a part of the main structure. For a structure (other than a mobile home) without a basement or poured footings, the "start of construction" means the affixing of the mobile home to its permanent site. For mobile homes within mobile home parks or mobile home subdivisions, "start of construction" is the date on which the construction of facilities for servicing the site on which the mobile home is to be affixed (including, at a minimum, the construction of streets, either final site grading or the pouring of concrete pads, and the installation of utilities) is completed.

t. "Structure" means a walled and roofed building, a mobile home, or gas or liquid storage tank, that is principally above ground.

u. "Substantial Improvement" means any repair, reconstruction or improvement of a structure, the cost of which equals or exceeds 50% of the market value of the structure either:

1. Before the improvement or repair is started

2. If the structure has been damaged and is being restored, before the damage occurred.

For the purpose of this definition "substantial improvement" is considered to occur when the first alteration of any wall, ceiling, floor or other structural part of the building commences, whether or not that alteration affects the external dimensions of the structure.

The term does not, however, include either:

3. Any project for improvement or a structure to comply with existing State or local health, sanitary or safety code specifications which are solely necessary to assure safe living conditions

4. Any alteration of a structure on the National Register of Historic Places or State Inventory of Historic Places.

v. "Variance" means a grant of relief by the planning board from the requirements of this ordinance which permits construction in a manner that would otherwise be prohibited by this ordinance because enforcement would result in unnecessary and unreasonable hardship.

18-3 General Provisions

18-3.1 Lands to Which This Ordinance Applies. This ordinance shall apply to all areas of special flood hazards within the jurisdiction of the Borough of Jamesburg, Middlesex County, New Jersey.

18-3.2 Basis for Establishing the Areas of Special Floor Hazard. The areas of special flood hazard identified by either the Federal Insurance

Administration in a scientific and engineering report or the most current Federal Emergency Management Agency Flood Insurance Study and any revisions thereto, with accompanying Flood Insurance Rate Maps and Flood Boundary-Floodway Maps is hereby adopted by reference and declared to be a part of this ordinance. The Flood Insurance Study is on file in the Office of the Borough Engineer.

18-3.3 Penalties for Non-compliance. No structure or land shall hereafter be constructed, located extended, converted, or altered without full compliance with the terms of this ordinance and other applicable regulations. Violation of the provisions of this ordinance by failure to comply with any of its requirements (including violation of conditions and safeguards established in connection with conditions) shall constitute a disorderly persons offense. Any person who violates this ordinance or fails to comply with any of its requirements shall, upon conviction thereof, be fined not more than $1,000.00 or imprisoned for not more than six months, or both, for each violation and in addition shall pay all costs and expenses involved in the case. Nothing herein contained shall prevent the borough from taking such other lawful action as is necessary to prevent or remedy any violation.

18-3.4 Abrogation and Greater Restrictions. This ordinance is not intended to repeal, abrogate, or impair any existing easements, covenants or deed restrictions. However, where this ordinance and other ordinances, easement, covenant or deed restriction conflict or overlap, whichever imposes the more stringent restrictions, shall prevail.

18-3.5 Interpretation. In the interpretation and application of this ordinance all provisions shall be:

a. Considered as minimum requirements

b. Liberally construed in favor of the governing body

c. Deemed neither to limit or repeal any other powers granted under state statutes.

18-3.6 Warning and Disclaimer of Liability. The degree of flood protection required by this ordinance is considered reasonable for regulatory purposes and is based upon scientific and engineering considerations. Large floods can and will occur on rare occasions. Flood heights may be increased by man-made or natural causes. This ordinance does not imply that land outside the area of special flood hazards or uses permitted within such areas will be free from flooding or flood damage. This ordinance shall not create liability on the part of the borough, any officer or employee thereof or the Federal Insurance Administration, for any flood damage that result from reliance on this ordinance or any administrative decision lawfully made thereunder.

18-4 Administration

18-4.1 Establishment of Development Permit. A development permit shall be obtained before construction or development begins within the area of special flood hazard established in Section 18-3.2. Application for a development permit shall be made on forms furnished by the borough engineer and may include, but not be limited to, plans in duplicate drawn to scale showing the nature, location, dimensions, and elevations of the area in question; existing or proposed structures, full storage of materials, drainage facilities and the location of the foregoing.

Specifically, the following information is required:

a. Elevation in relation to mean sea level, of the lowest flood (including basement: of all structures

b. Elevation in relation to mean sea level to which any structure has been floodproofed;

c. Certification by a registered professional engineer or architect that the floodproofing methods for any nonresidential structure meet the floodproofing criteria in Section 10-5.2(2)

d. Description of the extent to which any watercourse will be altered or relocated as a result of the proposed development

18-4.2 Designation of the Borough Engineer. The borough engineer is hereby appointed to administer and implement this ordinance by granting or denying development permit applications in accordance with its provisions.

18-4.3 Duties and Responsibilities of the Borough Engineer. Duties of the engineer shall include, but not be limited to:

a. Review all development permits to determine that the permit requirements of this ordinance have been satisfied

b. Review all development permits to determine that all necessary permits have been obtained form those Federal, State or local governmental agencies form which prior approval is required

c. Review all development permits to determine if the proposed development is located in the floodway. If located in the floodway, assure that the encroachment provisions of Section 18-5.3 (1) are met.

d. When base flood elevation and floodway data has not been provided in accordance with Section 18-3.2, BASIS FOR ESTABLISHING THE AREAS OF SPECIAL FLOOD HAZARD, the borough engineer shall obtain, review, and reasonably utilize any base flood elevation and floodway data available

from a Federal, State or other source, in order to administer Section 18-5.2a SPECIFIC STANDARDS,Residential Construction, and 18-5.2b SPECIFIC STANDARDS, Non-Residential construction.

e. Information to be obtained and maintained:

1. Obtain and record the actual elevation (in relation to mean sea level) of the lowest floor (including basement) of all new or substantially improved structures, and whether or not the structure contains a basement.

2. For all new or substantially improved floodproofed structures:

(a) Verify and record the actual elevation (in relation to mean sea level)

(b) Maintain the floodproofing certifications required in Section 18-4.1(c)

3. Maintain for public inspection all records pertaining to the provisions of this ordinance.

f. Alteration of Watercourses

1. Notify adjacent communities and the New jersey Department of Environmental Protection prior to any alteration or relocation of a watercourse and submit evidence of such notification to the Federal Insurance Administration.

2. Require that maintenance is provided within the altered or relocated portion of said watercourse so that the flood carrying capacity is not diminished.

g. Interpretation of FIRM Boundaries: Make interpretations where needed, as to the exact location of the boundaries of the areas of special flood hazards (for example, where there appears to be a conflict between a mapped boundary and actual field conditions). The person contesting the location of the boundary shall be given a reasonable opportunity to appeal the interpretation as provided in Section 18-4.4.

18-4.4 Appeals and Variances from the Provisions of this Ordinance.

a. Appeal Board

1. The planning board of the borough shall hear and decide appeals and requests for variances from the requirements of this ordinance.

2. The planning board shall hear and decide appeals when it is alleged there is an error in any requirements, decisions, determination

made by the borough engineer in the enforcement of or administration of this ordinance.

3. Those aggrieved by the decision of the planning board, or any taxpayer, may appeal such decision to the Superior Court of New Jersey.

4. In passing upon such application, the planning board, shall consider all technical evaluations, all relevant factors, standards specified in other sections of this ordinance:

(a) the danger that materials may be swept onto other lands to the injury of others

(b) the danger to life and property due to flooding or erosion damage.

(c) the susceptibility of the proposed facility and its contents to flood damage and the effect of such damage on the individual owner

(d) the importance of the services provided by the proposed facility to the community

(e) the necessity to the facility of a waterfront location, where applicable

(f) the availability of alternative locations for the proposed use which are not subject to flooding or erosion damage

(g) the compatibility of the proposed use with existing and anticipated development

(h) the relationship of the proposed use to comprehensive plan and flood plain management program of that area

(i) the safety of access to the property in times of flood for ordinary and emergency vehicles

(j) the expected heights, velocity, duration, rate of rise, and sediment transport of the flood waters and the effects of wave action, if applicable, expected at the site.

(k) the costs of providing governmental services during and after flood conditions, including maintenance and repair of public utilities and facilities such as sewer, gas, electrical and water systems, and streets and bridges

5. Upon consideration of the factors of Section 18-4.4-a4 and the purposes of this ordinance, the planning board may attach such

conditions to the granting of variances as it deems necessary to further the purposes of this ordinance.

6. The borough engineer shall maintain the records of all appeal actions, including technical information, and report any variances to the Federal Insurance Administration upon request.

b. Conditions for Variances

1. Generally, variances may be issued for new construction and substantial improvements to be erected on a lot of one-half acre or less in size contiguous to and surrounded by lots with existing structures constructed below the base flood level,provided items (a) through (k) in Section 18-4.4a4 have been fully considered. As the lot size increases beyond the one-half acre, the technical justification required for issuing the variance increases.

2. Variances may be issued for the reconstruction, rehabilitation or restoration of structures listed on the National Register of Historic Places or the State Inventory of Historic Places, without regard to the procedures set forth in the remainder of this section

3. Variances shall not be issued within any designated floodway, if any, increases in flood levels during the base flood discharge would result

4. Variances shall only be issued upon a determination that variance is the minimum necessary considering the flood hazard to afford relief

5. Variances shall only be issued upon:

(a) a showing of good faith and sufficient cause

(b) a determination that failure to grant the variance would result in exceptional hardship to the applicant

(c) a determination that the granting of a variance will not result in increased flood heights, additional threats to public safety, extraordinary, public expense, increase nuisances, cause fraud on or victimization of the public as identified in section 18-4.4a4 or conflict with existing local laws or ordinances.

6. Any applicant to whom a variance is granted shall be given written notice that the structure will be permitted to be built with a lowest flood elevation below the base flood elevation and that the cost of flood insurance will be with the increased risk resulting from the reduced lowest floor elevation

c. Application for Appeal to planning board

1. A complete application shall consist of

(a) ten copies of a plot plan

(b) six copies of all other plans in support of the plot plan

(c) photographs of the site

(d) application fee see section 18-4.c4

(e) application form

(f) all information as required by this chapter or any other ordinance

(g) Submission of estimated legal and engineering fees of the borough and planning board or the borough, which shall be placed in an escrow account and completed by an estimate of work hours required by the planning board attorney and engineer times their regular municipal hourly rate.

2. Upon submission of a complete application for such an appeal to the planning board, the applicant shall notify all property owners within 200 feet. A list of all property owners within 200 feet will be prepared by the borough at a cost to the applicant of $10.00. The applicant will also serve notice to the general public through a newspaper of general circulation in the municipality, to the borough environmental commission and to the municipal clerks and environmental commissions of other municipalities which are within 200 feet of said property.

Such notification shall include the name and address of the applicant, the location of the proposed use, and abbreviated description of the proposed use, and announcement of where and at what time the complete application may be reviewed and at what date the application will be heard by the planning board. This should be accomplished at least 120 days prior to the date the application is heard. It is also the responsibility of the applicant to provide proof of publication and service to the Administrative Office at least 1 day prior to the date of the meeting.

3. The planning board shall act upon any such appeal within 60 days of the submission of a complete application. If such appeal is field simultaneously with another type of application, (ie. subdivision, site plan, variance) the longer time period for decision shall apply.

4. Application for appeals shall be accompanied by the following review fees:

(a) Single Lot (residential) - $50.00

(b) Single lot (non-residential) - $100.00

(c) Subdivision within flood hazard - $100.00

(d) Site plan within flood hazard - $100.00

18-5 Provisions for Flood Hazard Reduction

18-5.1 General Standards. In areas of special flood hazards the following standards are required:

a. Anchoring

1. All new construction and substantial improvements shall be anchored to prevent flotation, collapse or lateral movement of the structure

2. All mobile homes shall be anchored to resist flotation, collapse, or lateral movement by providing over-the-top and frame ties to ground anchors. This requirement is in addition to applicable State and local anchoring requirements for resisting wind forces.

b. Construction Materials and Methods

1. All new construction and substantial improvements shall be constructed with materials and utility equipment resistant to flood damage

2. All new construction and substantial improvements shall be constructed using methods and practices that minimize flood damage

c. Utilities

1. All new and replacement water supply systems shall be designed to minimize or eliminate infiltration of flood waters into the system

2. New and replacement sanitary sewage systems shall be designed to minimize or eliminate infiltration of flood waters into the systems and discharge from the systems into flood waters

3. On-site waste disposal systems shall be located to avoid impairment of to them or contamination from them during flooding

4. Electrical, heating, ventilation, plumbing and air conditioning equipment and other service facilities shall be designed and/or located so as to prevent water from entering or accumulating within the components during conditions of flooding

d. Subdivision Proposals

1. All subdivision proposals shall be consistent with the need to minimize flood damage

2. All subdivision proposals shall have public utilities and facilities such as sewer, gas, electrical, and water systems located and constructed to minimize flood damage

3. All subdivision proposals shall have adequate drainage provided to reduce exposure to flood damage

4. Base flood elevation data shall be provided for subdivision proposals and other proposed development which contain at least 50 lots or 5 acres (whichever is less)

e. Enclosure Openings. For all new construction and substantial improvements, fully enclosed areas below the lowest floor that are subject to flooding shall be designed to automatically equalized hydrostatic flood forces on exterior walls by allowing for the entry and exit of floodwaters. Designs for meeting this requirement must either be certified by a registered professional engineer or architect or must meet or exceed the following minimum criteria: a minimum of 2 openings having a total net area of not less than one square inch for every square foot of enclosed area subject to flooding shall be provided. The bottom of all openings shall be no higher than one foot above grade. Openings may be equipped with screens, louvers, or other coverings or devices provided that they permit the automatic entry and exit of floodwaters.

18-5.2 Standards for Special Flood Hazard Areas with Base Flood Elevation Data. In all areas of special flood hazards where base flood elevation *data have been provided as set forth in section 18-3.2, Basis for Establishing the Areas for Special Flood Hazard, or in section 18-4.3d, Use of Other Base flood Data, the following standards are required:

a. Residential Construction: New construction and substantial improvement of any residential structure shall have the lowest floor, including basement, elevated to or above base flood elevation

b. Non-Residential Construction: New construction and substantial improvement of any commercial, industrial or other non-residential structure shall either have the lowest floor, including basement, elevated to the level of the base flood elevation,or:

1. be floodproofed so that below the base flood level the structure is watertight with walls substantially impermeable to the passage of water

2. have structural components capable of registering hydrostatic and hydrodynamic loads and effects of buoyancy

3. be certified by a registered professional engineer or architect that the designs and methods of construction are in accordance with accepted standards of practice for meeting the applicable provisions of this subsection. Such certification shall be provided tot he official *as set forth in Section 18-4.3e2.

c. Mobile Homes

1. Mobile homes shall be anchored in accordance with Section 18-5.1a2

2. For new mobile home parks and mobile home subdivisions; for expansions to existing mobile home parks and mobile home subdivisions where the repair, reconstruction or improvement of the streets, utilities and pads equals or exceeds 50 percent of value of the streets, utilities and pads before the repair, reconstruction or improvement has commenced; and for mobile homes not placed in a mobile home park or mobile home subdivision, require that:

(a) Stands or lots are elevated on compacted fill or on pilings so that the lowest floor of the mobile home will be at or above the base flood lever;

(b) Adequate surface drainage and access for a hauler are provided;

(c) in the instance of elevation and pilings, that;

(1) lots are large enough to permit steps

(2) piling foundations are placed in stable soil no more than ten feet apart,

(3) reinforcement is provided for pilings more than six feet above the ground level.

3. No mobile home shall be placed in a floodway, except in an existing mobile home subdivision.

4. All manufactured homes to be placed or substantially improved within an area of special flood hazard shall be elevated on a permanent foundation such that the top of the lowest floor is at or above the base flood elevation.

18-5.3 Floodways. Located within areas of special flood hazard *established in Section 18-3.2 are areas designated as floodways. Since the floodways is an extremely hazardous area due to the velocity of flood waters which carry debris, potential projectiles, and erosion potential, the following provisions apply:

a. Prohibit encroachments, including fill, new construction, substantial improvements, and other development unless a technical evaluation demonstrates that encroachments shall not result in any increase in flood levels during the occurrence of the base flood discharge.

b. If section 18-5.3a is satisfied, all new construction and substantial improvements shall comply with all applicable flood hazard reduction provisions of Section 18-5.0 Provisions for Flood Hazard Reduction.

c. Prohibit the placement of any mobile homes, except in an existing mobile home park or existing mobile home subdivision.

d. In all areas of special flood hazard in which base flood elevation data has been provided and no floodway has been designated, the cumulative effect of any proposed development, when combined with all other existing and anticipated development, shall not increase the water surface elevation of the base flood more than two-tenths (0.2) of a foot at any point.

e. All new construction and substantial improvements shall be elevated on piling or columns) is elevated to or above the base flood level, with all space below the lowest floor's supporting member open so as not to impede the flow of water, except for breakaway walls.

f.

1. All new construction and substantial improvements shall be securely anchored on piling or columns

2. The pile or column foundation and structure attached thereto shall be anchored to resist flotation, collapse or lateral movement due to the effects of wind and water loading values each of which shall be a one percent change of being equalled or exceeded in any given year (100 year mean recurrence interval)

3. There shall be no fill used for structural support

g. A registered professional engineer or architect shall develop or review the structural design specifications and plans for the construction and shall certify that the design and methods of construction to be used are in accordance with accepted standards of practice.

h.

1. Any alteration, repair, reconstruction, or improvement to a structure started after the enactment of this ordinance shall not enclose the space below the lowest floor unless breakaway walls, open wood latticework or insect screening are used as provided for in this section.

2. Breakaway walls, open wood lattice-work or insect screening shall be allowed below the base flood elevation provided that they are intended to collapse under wind and water loads without causing collapse, displacement or other structural damage to the elevated portion of the building or supporting foundation system. Breakaway walls shall not be designed for a safe loading resistance of not less than 10 and no more than 20 pounds per square foot. Use of breakaway walls which exceed a design safe loading of 20 pounds per square foot (either by design or when so required by local or state codes) may be permitted only if a registered professional engineer or architect certifies that the designs proposed meet the following conditions

(a) breakaway wall collapse shall result from a water load less than that which would occur during the base flood

(b) the elevated portion of the building and supporting foundation system shall not be subject to collapse, displacement or other structural damage due to the effects of wind and water load acting simultaneously on all building components (structural and non-structural).

3. If breakaway walls are utilized, such enclosed space shall be used solely for parking of vehicles, building access, or storage and not for human habitation.

4. Prior to construction, plans for any breakaway wall must be submitted to the borough for approval.